



Republic of Tunisia  
Ministry of Higher Education and Scientific Research  
University of Tunis El Manar  
National Engineering School of Tunis



# ENIT study plans 2023-2024

1. Civil Engineering
2. Hydraulic And Environmental Engineering
3. Electrical Engineering
4. Industrial Engineering
5. Modeling for Industry and Services Engineering
6. Mechanical Engineering
7. Computer Engineering
8. Telecommunications Engineering
9. Advanced Technics



EUROpean ACcredited Engineer

## First Year Civil Engineering / Hydraulic And Environmental Engineering - Semester 1 2023-2024

| Course Unit | Code | Course Title                           | Course hours |            |             |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|-------------|------|--|--------------|------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
|             |      |  | Lectures     | Tutorials  | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01        | 10a  | Mathematics for the engineer I         | 30           | 15         |             | 45           | 3                      | 8         | C                     | X               | X        |
|             | 11a  | Numerical Matrix Analysis              | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
|             | 12a  | Nonlinear numerical analysis           | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
|             | 13a  | Project Preparation Week 1st year      | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
| CU02        | 20a  | Solid state physics                    | 15           | 7,5        |             | 22,5         | 2                      | 10        |                       |                 | X        |
|             | 21a  | Measurements and instrumentation       | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
|             | 22a  | Physics and instrumentation Lab        |              |            | 22,5        | 22,5         | 1                      |           | C                     |                 |          |
|             | 23a  | Procedural programming                 | 30           | 15         |             | 45           | 3                      |           | C                     |                 | X        |
|             | 24a  | Mini Project in Procedural Programming |              | 7,5        | 15          | 22,5         | 2                      | C         |                       |                 |          |
| CU03        | 30a  | Geology for engineers                  | 21           | 9          | 15          | 45           | 3,5                    | 9         | C                     |                 | X        |
|             | 31a  | General mechanic                       | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
|             | 32a  | Continuum mechanics                    | 30           | 15         |             | 45           | 3,5                    |           | C                     |                 | X        |
| CU04        | 40a  | English 1                              |              | 22,5       |             | 22,5         | 1                      | 3         | C                     |                 |          |
|             | 41a  | French 1                               | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|             | 42a  | Business Management                    | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|             |      | <b>Total</b>                           | <b>231</b>   | <b>144</b> | <b>52,5</b> | <b>427,5</b> | <b>30</b>              | <b>30</b> | <b>10</b>             | <b>1</b>        | <b>9</b> |

## First Year Civil Engineering / Hydraulic And Environmental Engineering - Semester 2 2023-2024

| Course Unit | Code                                 | Course Title                               | Course hours |            |             |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|-------------|--------------------------------------|--|--------------|------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
|             |                                      |  | Lectures     | Tutorials  | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01        | 50a                                  | Mathematics for the engineer II            | 30           | 15         |             | 45           | 3                      | 8         |                       | X               | X        |
|             | 51a                                  | Digital Analysis Project                   |              | 7,5        | 15          | 22,5         | 1                      |           | C                     |                 |          |
|             | 52a                                  | End of Year Project of the 1st year GC/GHE |              |            | 22,5        | 22,5         | 2                      |           | C                     |                 |          |
|             | 53a                                  | System week                                | 15           | 7,5        |             | 22,5         | 2                      |           | C                     |                 |          |
| CU02        | 60a                                  | Theory of structures 1                     | 30           | 15         |             | 45           | 3,5                    | 9         |                       | X               | X        |
|             | 61a                                  | Soil mechanics 1                           | 24           | 12         | 9           | 45           | 3                      |           | C                     |                 | X        |
|             | 62a                                  | Topography                                 | 21           | 9          | 15          | 45           | 2,5                    |           | C                     |                 | X        |
| CU03        | 70a                                  | Fluid Mechanics                            | 24           | 12         | 9           | 45           | 3                      | 7         | C                     |                 | X        |
|             | 71a                                  | Building Materials 1                       | 21           | 9          | 15          | 45           | 2,5                    |           | C                     |                 | X        |
|             | ---                                  | A module to choose from:                   | 15           | 7,5        |             | 22,5         | 1,5                    |           | C                     |                 |          |
|             | 72d                                  | Building Information Modeling 1 (BIM 1)    |              |            |             |              |                        |           |                       |                 |          |
|             | 72e                                  | Rock mechanics                             |              |            |             |              |                        |           |                       |                 |          |
|             | 72f                                  | Thermal transfer in buildings              |              |            |             |              |                        |           |                       |                 |          |
|             | 72g                                  | Compressible fluids                        |              |            |             |              |                        |           |                       |                 |          |
| 72h         | Electrical installation and lighting |  |              |            |             |              |                        |           |                       |                 |          |
| CU04        | 80a                                  | English 2                                  |              | 22,5       |             | 22,5         | 1                      | 6         | C                     |                 |          |
|             | 81a                                  | French 2                                   | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|             | 82a                                  | General economy                            | 30           | 15         |             | 45           | 2                      |           | C                     |                 | X        |
|             | 83a                                  | Entrepreneurship and innovation            | 15           | 7,5        |             | 22,5         | 2                      |           | C                     |                 |          |
|             |                                      | <b>Total</b>                               | <b>240</b>   | <b>147</b> | <b>85,5</b> | <b>472,5</b> | <b>30</b>              | <b>30</b> | <b>12</b>             | <b>2</b>        | <b>7</b> |

| Civil Engineering - Second Year - Semester 1<br>2023-2024 |      |                                    |              |            |           |              |                        |           |                       |                 |           |
|---|------|------------------------------------|--------------|------------|-----------|--------------|------------------------|-----------|-----------------------|-----------------|-----------|
| Course Unit   | Code | Course Title                       | Course hours |            |           |              | Credits / Coefficients |           | Evaluation mode       |                 |           |
|   |      |                                    | Lectures     | Tutorials  | PW        | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01  | 10b  | Reinforced concrete 1              | 30           | 15         |           | 45           | 3,5                    | 9         |                       | X               | X         |
|   | 11b  | Markets and regulations            | 15           | 7,5        |           | 22,5         | 1                      |           |                       |                 | X         |
|   | 12b  | Architecture                       | 15           | 7,5        |           | 22,5         | 1,5                    |           |                       |                 | X         |
|   | 13b  | Hydraulics                         | 21           | 9          | 15        | 45           | 3                      |           | C                     |                 | X         |
| CU02  | 20b  | Soil mechanics 2                   | 21           | 9          | 15        | 45           | 3,5                    | 10        | C                     |                 | X         |
|   | 21b  | Theory of structures 2             | 30           | 15         |           | 45           | 3,5                    |           |                       | X               | X         |
|   | 22b  | General construction processes     | 24           | 6          | 15        | 45           | 3                      |           | C                     |                 | X         |
| CU03  | 30b  | Probability                        | 15           | 7,5        |           | 22,5         | 1,5                    | 7         |                       |                 | X         |
|   | 31b  | Statistics                         | 15           | 7,5        |           | 22,5         | 1,5                    |           |                       |                 | X         |
|   | 32b  | Finite elements 1                  | 15           | 7,5        |           | 22,5         | 1,5                    |           |                       |                 | X         |
|   | 33b  | Finite elements 2                  | 7,5          |            | 15        | 22,5         | 1,5                    |           | C                     |                 |           |
|   | 34b  | Opening week                       | 15           | 7,5        |           | 22,5         | 1                      |           | C                     |                 |           |
| CU04  | 40b  | English 3                          |              | 22,5       |           | 22,5         | 1                      | 4         | C                     |                 |           |
|   | 41b  | French 3                           | 15           | 7,5        |           | 22,5         | 1                      |           | C                     |                 |           |
|   | 42b  | Communications and self-management | 15           | 7,5        |           | 22,5         | 1                      |           | C                     |                 |           |
|   | 43b  | Project Preparation Week 2nd year  |              | 22,5       |           | 22,5         | 1                      |           | C                     |                 |           |
|   |      | <b>Total</b>                       | <b>253,5</b> | <b>159</b> | <b>60</b> | <b>472,5</b> | <b>30</b>              | <b>30</b> | <b>9</b>              | <b>2</b>        | <b>10</b> |

| Civil Engineering - Second Year - Semester 2<br>2023-2024 |                          |   |              |              |              |            |                        |           |                       |                 |          |
|---|--------------------------|---|--------------|--------------|--------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code                     | Course Title                            | Course hours |              |              |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |                          |   | Lectures     | Tutorials    | PW           | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 50b                      | Operational Research and Optimization   | 30           | 15           |              | 45         | 3                      | 7         |                       | X               | X        |
|   | 51b                      | Reinforced concrete 2                   | 15           |              | 7,5          | 22,5       | 2                      |           | C                     |                 |          |
|   | 52b                      | DAO + civil engineering softwares       |              | 22,5         |              | 22,5       | 2                      |           | C                     |                 |          |
| CU02  | 60b                      | Steel design 1                          | 30           | 15           |              | 45         | 3,5                    | 10        | C                     |                 | X        |
|   | 61b                      | Roads Engineering                       | 30           | 15           |              | 45         | 3,5                    |           | C                     |                 | X        |
|   | ---                      | A module to choose from the list L1:    | 30           | 15           |              | 45         | 3                      |           |                       |                 |          |
|   | 62k                      | Composite materials and homogeneisqtion |              |              |              |            |                        |           | C                     |                 | X        |
|   | 62l                      | Plates and hulls                        |              |              |              |            |                        |           | C                     |                 |          |
|   | 62m                      | Design and calculation of structures    |              |              |              |            |                        |           |                       | X               | X        |
| CU03  | 62n                      | Multicriteria and GEORISK modeling      |              |              |              |            |                        | C         |                       |                 |          |
|   | 70b                      | Hydrology                               | 21           | 9            | 15           | 45         | 3                      | 8         | C                     |                 | X        |
|   | 71b                      | Urban hydraulics                        | 21           | 9            | 15           | 45         | 3                      |           | C                     |                 | X        |
|   | ---                      | A module to choose from the list L2:    | 15           | 7,5          |              | 22,5       | 2                      |           | C                     |                 |          |
|   | 72k                      | GIS and Remote Sensing                  |              |              |              |            |                        |           |                       |                 |          |
|   | 72l                      | Structures dynamics                     |              |              |              |            |                        |           |                       |                 |          |
| 72m   | Modeling of porous media |   |              |              |              |            |                        |           |                       |                 |          |
| CU04  | ---                      | A module to choose from:                |              | 22,5         |              | 22,5       | 1                      | 5         | C                     |                 |          |
|   | 80k                      | English 4                               |              |              |              |            |                        |           |                       |                 |          |
|   | 80l                      | German I                                |              |              |              |            |                        |           |                       |                 |          |
|   | 80m                      | Chinese 1                               |              |              |              |            |                        |           |                       |                 |          |
|   | 81b                      | End of Year Project of the 2nd year GC  |              |              | 90           | 90         | 4                      |           | C                     |                 |          |
| <b>Total</b>  |                          |   | <b>192</b>   | <b>130,5</b> | <b>127,5</b> | <b>450</b> | <b>30</b>              | <b>30</b> | <b>12</b>             | <b>2</b>        | <b>7</b> |

| Civil Engineering - Third Year - Semester 1<br>2023-2024 |      |   |              |            |            |            |                        |           |                       |                 |          |
|--|------|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit  | Code | Course Title  | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |      |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 10c  | Prestressed concrete                                | 21           | 9          | 15         | 45         | 3,5                    | 10        | C                     |                 | X        |
|  | 11c  | Artwork   | 21           | 9          | 15         | 45         | 3,5                    |           | C                     |                 | X        |
|  | ---  | A module to choose from the list L3:                | 30           | 15         |            | 45         | 3                      |           | C                     |                 | X        |
|  | 12r  | Building physics                                    |              |            |            |            |                        |           |                       |                 |          |
|  | 12s  | Earth and underground structures                    |              |            |            |            |                        |           |                       |                 |          |
|  | 12t  | Infrastructures and roads                           |              |            |            |            |                        |           |                       |                 |          |
|  | 12u  | Mixed structures                                    |              |            |            |            |                        |           |                       |                 |          |
|  | 12v  | Precast concrete structures                         |              |            |            |            |                        |           |                       |                 |          |
|  | 12w  | The pathology of constructions                      |              |            |            |            |                        |           |                       |                 |          |
| CU02   | 20c  | Steel design 2                                      | 21           | 9          | 15         | 45         | 3,5                    | 8         | C                     |                 | X        |
|  | 21c  | Environmental impact                                | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|  | ---  | A module to choose from the list L4:                | 30           | 15         |            | 45         | 3                      |           | C                     |                 | X        |
|  | 22r  | Building Information Modeling 2 (BIM 2)             |              |            |            |            |                        |           |                       |                 |          |
|  | 22s  | Structural optimisation                             |              |            |            |            |                        |           |                       |                 |          |
|  | 22t  | Urbistics, Transportation Planning and Optimization |              |            |            |            |                        |           |                       |                 |          |
|  | 22u  | Project financial analysis                          |              |            |            |            |                        |           |                       |                 |          |
|  | 22v  | Soil improvement                                    |              |            |            |            |                        |           |                       |                 |          |
|  | 22w  | Theory of structures 3                              |              |            |            |            |                        |           |                       |                 |          |
| CU03   | 30c  | Synthesis projects                                  |              | 45         |            | 45         | 3,5                    | 8         | C                     |                 |          |
|  | 31c  | Project Preparation Week 3rd year                   |              | 22,5       |            | 22,5       | 1                      |           | C                     |                 |          |
|  | 32c  | Hydraulic structures                                | 21           | 9          | 15         | 45         | 3,5                    |           | C                     |                 |          |
| CU04   | ---  | A module to choose from:                            |              | 22,5       |            | 22,5       | 1                      | 4         | C                     |                 |          |
|  | 40r  | English 5   |              |            |            |            |                        |           |                       |                 |          |
|  | 40s  | German 2  |              |            |            |            |                        |           |                       |                 |          |
|  | 40t  | Chinese 2   |              |            |            |            |                        |           |                       |                 |          |
|  | 41c  | Business law  | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |          |
|  | 42c  | Project Management                                  | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 | X        |
|  | 43c  | Professional integration and career development     | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |          |
| Semester 2   |      |   |              |            |            |            |                        |           |                       |                 |          |
| CU01   | 60c  | End of study project                                |              |            | 450        | 450        | 30                     | 30        | X                     |                 |          |
|  |      | <b>Total</b>  | <b>204</b>   | <b>186</b> | <b>510</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>13</b>             | <b>0</b>        | <b>6</b> |

| Hydraulic And Environmental Engineering - Second Year - Semester 1<br>2023-2024 |      |                                       |              |            |           |            |                        |           |                       |                 |          |
|---|------|---------------------------------------|--------------|------------|-----------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title                          | Course hours |            |           |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |                                       | Lectures     | Tutorials  | PW        | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 10b  | Hydrometry - Hydrology                | 30           | 15         |           | 45         | 3,5                    | 10        |                       | X               | X        |
|   | 11b  | Hydro geology                         | 30           | 15         |           | 45         | 3,5                    |           |                       | X               | X        |
|   | 12b  | Pipe flows                            | 21           | 9          | 15        | 45         | 3                      |           | C                     |                 | X        |
| CU02  | 20b  | Operational Research and Optimization | 30           | 15         |           | 45         | 3                      | 7         |                       | X               | X        |
|   | 21b  | Probability                           | 15           | 7,5        |           | 22,5       | 1,5                    |           |                       |                 | X        |
|   | 22b  | Statistics                            | 15           | 7,5        |           | 22,5       | 1,5                    |           |                       |                 | X        |
|   | 23b  | Opening week                          | 15           | 7,5        |           | 22,5       | 1                      |           | C                     |                 |          |
| CU03  | 30b  | Turbulence                            | 15           | 7,5        |           | 22,5       | 2                      | 9         | C                     |                 |          |
|   | 31b  | Structure                             | 15           | 7,5        |           | 22,5       | 1,5                    |           | C                     |                 |          |
|   | 32b  | Soil mechanics                        | 15           | 7,5        |           | 22,5       | 2                      |           | C                     |                 |          |
|   | 33b  | Reinforced concrete 1                 | 30           | 15         |           | 45         | 3,5                    |           |                       | X               | X        |
| CU04  | 40b  | English 3                             |              | 22,5       |           | 22,5       | 1                      | 4         | C                     |                 |          |
|   | 41b  | French 3                              | 15           | 7,5        |           | 22,5       | 1                      |           | C                     |                 |          |
|   | 42b  | Project Preparation Week 2nd year     |              | 22,5       |           | 22,5       | 1                      |           | C                     |                 |          |
|   | 43b  | Communications and self-management    | 15           | 7,5        |           | 22,5       | 1                      |           | C                     |                 |          |
|   |      | <b>Total</b>                          | <b>261</b>   | <b>174</b> | <b>15</b> | <b>450</b> | <b>30</b>              | <b>30</b> | <b>9</b>              | <b>4</b>        | <b>7</b> |

## Hydraulic And Environmental Engineering - Second Year - Semester 2 2023-2024

| Course Unit  | Code                                    | Course Title   | Course hours |            |              |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|--------------|---|--|--------------|------------|--------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
|              |   |  | Lectures     | Tutorials  | PW           | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01         | 50b                                     | Water supply   | 15           | 7,5        |              | 22,5         | 2                      | 9         | C                     |                 |          |
|              | 51b                                     | Urban sewerage   | 15           | 7,5        |              | 22,5         | 2                      |           | C                     |                 |          |
|              | 52b                                     | Treatment and reuse of wastewater                        | 21           | 9          | 15           | 45           | 3                      |           | C                     |                 | X        |
|              | 53b                                     | Hydraulic Machines and Pumping Stations 1                | 15           | 7,5        |              | 22,5         | 2                      |           | C                     |                 |          |
| CU02         | 60b                                     | Open channel flows                                       | 15           | 7,5        |              | 22,5         | 2                      | 6         | C                     |                 |          |
|              | 61b                                     | GIS - Remote sensing                                     | 21           | 9          | 15           | 45           | 2,5                    |           | C                     |                 | X        |
|              | 62b                                     | Codes in Hydraulics / Urban Hydrology (EPANET-SWWM)      |              | 15         | 7,5          | 22,5         | 1,5                    |           | C                     |                 |          |
| CU03         | 70b                                     | Steel design 1   | 30           | 15         |              | 45           | 3,5                    | 8         |                       | X               | X        |
|              | 71b                                     | Roads Engineering 1                                      | 15           | 7,5        |              | 22,5         | 1,5                    |           | C                     |                 |          |
|              | 72b                                     | Codes in Fluids Mechanics and Industrial Fluid Mechanics |              | 15         | 7,5          | 22,5         | 1,5                    |           | C                     |                 |          |
|              | 73b                                     | Codes / memoirs in urban hydraulics                      |              | 15         | 7,5          | 22,5         | 1,5                    |           | C                     |                 |          |
| CU04         | ---                                     | A module to choose from:                                 |              | 22,5       |              | 22,5         | 1                      | 7         | C                     |                 |          |
|              | 80k                                     | English 4  |              |            |              |              |                        |           |                       |                 |          |
|              | 80l                                     | German I   |              |            |              |              |                        |           |                       |                 |          |
|              | 80m                                     | Chinese 1  |              |            |              |              |                        |           |                       |                 |          |
|              | ---                                     | A module to choose from the list L1:                     | 15           | 7,5        |              | 22,5         | 1                      |           | C                     |                 |          |
|              | 81k                                     | hHydrochemistry  |              |            |              |              |                        |           |                       |                 |          |
|              | 81l                                     | Cartography and Spatial Analysis                         |              |            |              |              |                        |           |                       |                 |          |
|              | ---                                     | A module to choose from the list L2:                     | 15           | 7,5        |              | 22,5         | 1                      |           |                       |                 | X        |
|              | 82k                                     | Finite elements GHE                                      |              |            |              |              |                        |           |                       |                 |          |
|              | 82l                                     | Hydraulic Machines and Pumping Stations 2                |              |            |              |              |                        |           |                       |                 |          |
| 83b          | End of Year Project of the 2nd year GHE |  |              | 90         | 90           | 4            | C                      |           |                       |                 |          |
| <b>Total</b> |   |  | <b>177</b>   | <b>153</b> | <b>142,5</b> | <b>472,5</b> | <b>30</b>              | <b>30</b> | <b>13</b>             | <b>1</b>        | <b>4</b> |



## Hydraulic And Environmental Engineering - Third Year - Semester 1 2023-2024

| Course Unit       | Code  | Course Title                                 | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|-------------------|---|--|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
|                   |   |  | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01              | 10c   | Dispersion of atmospheric pollution          | 21           | 9          | 15         | 45         | 3                      | 9         | C                     |                 | X        |
|                   | 11c   | Erosion and water basins transferts          | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |          |
|                   | 12c   | Urban amenities and floods                   | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|                   | 13c   | Hydrodynamics and quality models             | 15           | 7,5        |            | 22,5       | 2,5                    |           | C                     |                 |          |
| CU02              | 20c   | Prestressed concrete 1                       | 15           | 7,5        |            | 22,5       | 1,5                    | 9         |                       |                 | X        |
|                   | 21c   | Hydraulic works and works                    | 21           | 9          | 15         | 45         | 3                      |           | C                     |                 |          |
|                   | 22c   | environmental impact                         | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|                   | 23c   | Maritime hydraulics and coastal developments | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|                   | ---   | A module to choose from the list L3:         | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X        |
|                   | 24r   | Hydrological warning systems                 |              |            |            |            |                        |           |                       |                 |          |
|                   | 24s   | Aquatic ecosystems                           |              |            |            |            |                        |           |                       |                 |          |
|                   | 24t   | Transient flow 1                             |              |            |            |            |                        |           |                       |                 |          |
|                   | 24u   | Solid waste                                  |              |            |            |            |                        |           |                       |                 |          |
| CU03              | 24v   | Desalination                                 |              |            |            |            |                        |           |                       |                 |          |
|                   | 30c   | Petroleum systems                            | 21           | 9          | 15         | 45         | 3                      | 7         | C                     |                 | X        |
|                   | 31c   | Two-phase flows in oil tanks                 | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |          |
| 32c               | Petroleum transport in pipelines                | 15   | 7,5          |            | 22,5       | 2          | C                      |           |                       |                 |          |
| CU04              | ---   | A module to choose from:                     |              | 22,5       |            | 22,5       | 1                      | 5         | C                     |                 |          |
|                   | 40r   | English 5                                    |              |            |            |            |                        |           |                       |                 |          |
|                   | 40s   | German 2                                     |              |            |            |            |                        |           |                       |                 |          |
|                   | 40t   | Chinese 2                                    |              |            |            |            |                        |           |                       |                 |          |
|                   | 41c   | Business law                                 | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |          |
|                   | 42c   | Project Preparation Week 3rd year            |              | 22,5       |            | 22,5       | 1                      |           | C                     |                 |          |
|                   | 43c   | Project Management                           | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 | X        |
| 44c               | Professional integration and career development | 15   | 7,5          |            | 22,5       | 1          | C                      |           |                       |                 |          |
| <b>Semester 2</b> |   |  |              |            |            |            |                        |           |                       |                 |          |
| CU01              | 60c   | End of study project                         |              |            | 450        | 450        | 30                     | 30        | X                     |                 |          |
|                   |   | <b>Total</b>                                 | <b>243</b>   | <b>162</b> | <b>495</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>15</b>             | <b>0</b>        | <b>5</b> |

| Electrical Engineering - First Year - Semester 1<br>2023-2024 |      |  |              |            |             |              |                        |           |                       |                 |          |
|---|------|--|--------------|------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title                           | Course hours |            |             |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |  | Lectures     | Tutorials  | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 10a  | Mathematics for the engineer I         | 30           | 15         |             | 45           | 3                      | 8         | C                     | X               | X        |
|   | 11a  | Numerical Matrix Analysis              | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
|   | 12a  | Project Preparation Week 1st year      | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|   | 13a  | Solid state physics                    | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
| CU02  | 20a  | Digital Electronics 1                  | 15           | 7,5        |             | 22,5         | 2                      | 7         |                       |                 | X        |
|   | 21a  | Procedural programming                 | 30           | 15         |             | 45           | 3                      |           | C                     |                 | X        |
|   | 22a  | Mini Project in Procedural Programming |              | 7,5        | 15          | 22,5         | 2                      |           | C                     |                 |          |
| CU03  | 30a  | General control system                 | 30           | 15         |             | 45           | 3,5                    | 12        |                       | X               | X        |
|   | 31a  | Lab Electronics/Electrical circuits    |              |            | 22,5        | 22,5         | 2                      |           | C                     |                 |          |
|   | 32a  | Electronics I                          | 30           | 15         |             | 45           | 3,5                    |           | C                     |                 | X        |
|   | 33a  | Electrical circuits                    | 30           | 15         |             | 45           | 3                      |           |                       | X               | X        |
| CU04  | 40a  | English 1                              |              | 22,5       |             | 22,5         | 1                      | 3         | C                     |                 |          |
|   | 41a  | French 1                               | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|   | 42a  | Business Management                    | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|   |      | <b>Total</b>                           | <b>240</b>   | <b>150</b> | <b>37,5</b> | <b>427,5</b> | <b>30</b>              | <b>30</b> | <b>9</b>              | <b>3</b>        | <b>8</b> |

| Electrical Engineering - First Year - Semester 2<br>2023-2024 |      |                                       |              |              |             |            |                        |           |                       |                 |          |
|---|------|---------------------------------------|--------------|--------------|-------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title                          | Course hours |              |             |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |                                       | Lectures     | Tutorials    | PW          | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 50a  | Probability                           | 15           | 7,5          |             | 22,5       | 1,5                    | 11        |                       |                 | X        |
|   | 51a  | Statistics                            | 15           | 7,5          |             | 22,5       | 1,5                    |           |                       |                 | X        |
|   | 52a  | System week                           | 15           | 7,5          |             | 22,5       | 2                      |           | C                     |                 |          |
|   | 53a  | Measurements and instrumentation      | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X        |
|   | 54a  | Physics and instrumentation Lab       |              |              | 22,5        | 22,5       | 1                      |           | C                     |                 |          |
|   | 55a  | Operational Research and Optimization | 30           | 15           |             | 45         | 3                      |           | X                     | X               |          |
| CU02  | 60a  | Electrical machines I                 | 15           | 7,5          |             | 22,5       | 2                      | 6         |                       |                 | X        |
|   | ---  | A module to choose from:              | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |          |
|   | 61d  | eBusiness                             |              |              |             |            |                        |           |                       |                 |          |
|   | 61e  | Manufactory resource planning         |              |              |             |            |                        |           |                       |                 |          |
|   | 61f  | Introduction to renewable energies    |              |              |             |            |                        |           |                       |                 |          |
|   | 62a  | Electrical equipments and protection  | 15           | 7,5          | 10,5        | 33         | 2                      |           | C                     |                 |          |
|   | 63a  | Materials for electrical engineering  | 15           | 7,5          |             | 22,5       | 1                      | C         |                       |                 |          |
| CU03  | 70a  | Microprocessors and microcontrollers  | 15           | 7,5          |             | 22,5       | 2                      | 7         |                       |                 | X        |
|   | 71a  | Mini-project of electronics           |              | 6            | 12          | 18         | 1                      |           | C                     |                 |          |
|   | 72a  | Signal processing 1                   | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X        |
|   | 73a  | Lab Microprocessors/Control systems   |              |              | 22,5        | 22,5       | 2                      |           | C                     |                 |          |
| CU04  | 80a  | English 2                             |              | 22,5         |             | 22,5       | 1                      | 6         | C                     |                 |          |
|   | 81a  | French 2                              | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |          |
|   | 82a  | General economy                       | 30           | 15           |             | 45         | 2                      |           | C                     |                 | X        |
|   | 83a  | Entrepreneurship and innovation       | 15           | 7,5          |             | 22,5       | 2                      |           | C                     |                 |          |
|   |      | <b>Total</b>                          | <b>240</b>   | <b>148,5</b> | <b>67,5</b> | <b>456</b> | <b>30</b>              | <b>30</b> | <b>11</b>             | <b>1</b>        | <b>8</b> |

| Electrical Engineering - Second Year - Semester 1<br>2023-2024 |      |                                     |              |              |           |              |                        |           |                       |                 |          |
|--|------|-------------------------------------|--------------|--------------|-----------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit  | Code | Course Title                        | Course hours |              |           |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |      |                                     | Lectures     | Tutorials    | PW        | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 10b  | Object-oriented programming         | 30           | 15           |           | 45           | 3                      | 10        | C                     |                 | X        |
|  | 11b  | Advanced microcontrollers           | 15           | 7,5          | 10,5      | 33           | 3                      |           | C                     |                 |          |
|  | 12b  | Digital processing of the signal EE | 30           | 15           |           | 45           | 3                      |           |                       | X               | X        |
|  | 13b  | Opening week                        | 15           | 7,5          |           | 22,5         | 1                      |           | C                     |                 |          |
| CU02   | 20b  | Power electronics                   | 30           | 15           |           | 45           | 3                      | 7         |                       | X               | X        |
|  | 21b  | Electrical machines II              | 15           | 7,5          | 15        | 37,5         | 2                      |           | C                     |                 | X        |
|  | 22b  | Electrical installation             | 15           | 7,5          |           | 22,5         | 1                      |           | C                     |                 |          |
|  | 23b  | Electrical networks                 | 15           | 7,5          |           | 22,5         | 1                      |           | C                     |                 |          |
| CU03   | 30b  | Systems analysis and control        | 30           | 15           |           | 45           | 3                      | 10        | C                     |                 | X        |
|  | 31b  | Industrial Automation               | 15           | 7,5          |           | 22,5         | 2                      |           |                       |                 | X        |
|  | 32b  | Lab Automation/Electronics II       |              |              | 22,5      | 22,5         | 2                      |           | C                     |                 |          |
|  | 33b  | Electronics II                      | 30           | 15           |           | 45           | 3                      |           |                       | X               | X        |
| CU04   | 40b  | English 3                           |              | 22,5         |           | 22,5         | 1                      | 3         | C                     |                 |          |
|  | 41b  | French 3                            | 15           | 7,5          |           | 22,5         | 1                      |           | C                     |                 |          |
|  | 42b  | Project Preparation Week 2nd year   |              | 22,5         |           | 22,5         | 1                      |           | C                     |                 |          |
|  |      | <b>Total</b>                        | <b>255</b>   | <b>172,5</b> | <b>48</b> | <b>475,5</b> | <b>30</b>              | <b>30</b> | <b>11</b>             | <b>3</b>        | <b>7</b> |

| Electrical Engineering - Second Year - Semester 2<br>2023-2024 |                           |   |              |            |              |              |                        |           |                       |                 |          |
|--|---------------------------|---|--------------|------------|--------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit  | Code                      | Course Title                                | Course hours |            |              |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |                           |   | Lectures     | Tutorials  | PW           | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 50b                       | Operating systems                           | 15           | 7,5        |              | 22,5         | 2                      | 8         | C                     |                 |          |
|  | 51b                       | Mini-project object oriented programming    |              | 7,5        | 15           | 22,5         | 2                      |           | C                     |                 |          |
|  | 52b                       | Embedded systems                            | 15           | 7,5        |              | 22,5         | 2                      |           |                       |                 | X        |
|  | 53b                       | Embedded Systems Mini Project               |              | 7,5        | 15           | 22,5         | 2                      |           | C                     |                 |          |
| CU02   | 60b                       | Electronics systems                         | 15           | 7,5        |              | 22,5         | 2                      | 8         |                       |                 | X        |
|  | 61b                       | Design of digital programmable circuits     | 30           | 15         |              | 45           | 3                      |           |                       | X               | X        |
|  | 62b                       | Lab Power electronics                       |              |            | 15           | 15           | 1                      |           | C                     |                 |          |
|  | 63b                       | Lab Signal processing/Programmable circuits |              |            | 22,5         | 22,5         | 2                      |           | C                     |                 |          |
| CU03   | ---                       | A module to choose from:                    | 15           | 7,5        |              | 22,5         | 2                      | 8         | C                     |                 |          |
|  | 70k                       | Programming tools                           |              |            |              |              |                        |           |                       |                 |          |
|  | 70l                       | Computer Networks                           |              |            |              |              |                        |           |                       |                 |          |
|  | 70m                       | Automation & IOT                            |              |            |              |              |                        |           |                       |                 |          |
|  | 70n                       | Mobile programming                          |              |            |              |              |                        |           |                       |                 |          |
|  | 71b                       | Signal transmission                         | 15           | 7,5        |              | 22,5         | 2                      |           |                       |                 | X        |
|  | 72b                       | Mini-project of control systems             |              | 6          | 12           | 18           | 2                      |           | C                     |                 |          |
|  | ---                       | A module to choose from:                    | 15           | 7,5        |              | 22,5         | 2                      |           | C                     |                 |          |
|  | 73k                       | Communication circuits                      |              |            |              |              |                        |           |                       |                 |          |
|  | 73l                       | Applied control system                      |              |            |              |              |                        |           |                       |                 |          |
|  | 73m                       | Control of power converters                 |              |            |              |              |                        |           |                       |                 |          |
| 73n  | Applied signal processing |   |              |            |              |              |                        |           |                       |                 |          |
| CU04   | ---                       | A module to choose from:                    |              | 22,5       |              | 22,5         | 1                      | 6         | C                     |                 |          |
|  | 80k                       | English 4                                   |              |            |              |              |                        |           |                       |                 |          |
|  | 80l                       | German I                                    |              |            |              |              |                        |           |                       |                 |          |
|  | 80m                       | Chinese 1                                   |              |            |              |              |                        |           |                       |                 |          |
|  | 81b                       | End of Year Project of the 2nd year GE      |              |            | 90           | 90           | 4                      |           | C                     |                 |          |
|  | 82b                       | Communications and self-management          | 15           | 7,5        |              | 22,5         | 1                      |           | C                     |                 |          |
| <b>Total</b>   |                           |   | <b>135</b>   | <b>111</b> | <b>169,5</b> | <b>415,5</b> | <b>30</b>              | <b>30</b> | <b>11</b>             | <b>1</b>        | <b>4</b> |

| Electrical Engineering - Third Year<br>Option 1: Automatic and Computer Engineering - Semester 1<br>2023-2024 |      |   |              |            |            |            |                        |           |                       |                 |          |
|---|------|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title  | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 10c  | Design of real time systems                                 | 15           | 7,5        |            | 22,5       | 2                      | 7         | C                     |                 |          |
|   | 11c  | Embedded and real time systems: Engineering Design Projects |              | 18         |            | 18         | 1                      |           | C                     |                 |          |
|   | ---  | A module to choose from:                                    | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |          |
|   | 12r  | Image processing  |              |            |            |            |                        |           |                       |                 |          |
|   | 12s  | Machine learning EG   |              |            |            |            |                        |           |                       |                 |          |
| CU02  | 13c  | LabVIEW   | 15           | 7,5        |            | 22,5       | 2                      | 9         |                       |                 | X        |
|   | 20c  | Intelligent control   | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|   | 21c  | Advanced control methods                                    | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|   | 22c  | Analysis and control of nonlinear systems                   | 30           | 15         |            | 45         | 3                      |           | C                     |                 | X        |
|   | 23c  | Digital control systems design: Engineering Design Projects |              | 18         |            | 18         | 1                      |           | C                     |                 |          |
| CU03  | 24c  | Signal and image processing: Engineering Design Projects    |              | 18         |            | 18         | 1                      | C         |                       |                 |          |
|   | ---  | A module to choose from:                                    | 15           | 7,5        |            | 22,5       | 2                      | C         |                       |                 |          |
|   | 30r  | <i>Control system technology</i>                            |              |            |            |            |                        |           |                       |                 |          |
|   | 30s  | <i>Module to be precised</i>                                |              |            |            |            |                        |           |                       |                 |          |
|   | 31c  | Industrial LANs   | 15           | 7,5        |            | 22,5       | 2                      | C         |                       |                 |          |
|   | 32c  | Industrial automation: Engineering Design Projects          |              | 18         |            | 18         | 1                      | C         |                       |                 |          |
|   | 33c  | Robotics  | 15           | 7,5        |            | 22,5       | 2                      |           |                       | X               |          |
|   | 34c  | Robotics: Engineering Design Projects                       |              | 18         |            | 18         | 1                      | C         |                       |                 |          |
|   | ---  | A module to choose from:                                    | 15           | 7,5        |            | 22,5       | 1                      | C         |                       |                 |          |
| CU04  | 35r  | <i>Complex dynamic systems</i>                              |              |            |            |            |                        |           |                       |                 |          |
|   | 35s  | <i>Advanced Robot Controls</i>                              |              |            |            |            |                        |           |                       |                 |          |
|   | ---  | A module to choose from:                                    |              | 22,5       |            | 22,5       | 1                      | C         |                       |                 |          |
|   | 40r  | <i>English 5</i>  |              |            |            |            |                        |           |                       |                 |          |
|   | 40s  | German 2  |              |            |            |            |                        |           |                       |                 |          |
|   | 40t  | Chinese 2   |              |            |            |            |                        |           |                       |                 |          |
|   | 41c  | Business law  | 15           | 7,5        |            | 22,5       | 1                      | C         |                       |                 |          |
|   | 42c  | Project Preparation Week 3rd year                           |              | 22,5       |            | 22,5       | 1                      | C         |                       |                 |          |
| CU01  | 43c  | Project Management  | 15           | 7,5        |            | 22,5       | 1                      |           |                       | X               |          |
|   | 44c  | Professional integration and career development             | 15           | 7,5        |            | 22,5       | 1                      | C         |                       |                 |          |
| Semester 2  |      |   |              |            |            |            |                        |           |                       |                 |          |
| CU01  | 60c  | End of study project  |              |            | 450        | 450        | 30                     | 30        | X                     |                 |          |
|   |      | <b>Total</b>  | <b>210</b>   | <b>240</b> | <b>450</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>16</b>             | <b>0</b>        | <b>6</b> |

## Electrical Engineering - Third Year Option 2: Electronics and Microelectronics - Semester 1 2023-2024

| Course Unit       | Code                  | Course Title  | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|-------------------|-----------------------|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
|                   |                       |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01              | 10x                   | Design of real time systems   | 15           | 7,5        |            | 22,5       | 2                      | 7         | C                     |                 |          |
|                   | 11x                   | Embedded and real time systems: Engineering Design Projects                         |              | 18         |            | 18         | 1                      |           | C                     |                 |          |
|                   | ---                   | A module to choose from:  | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |          |
|                   | 12t                   | Image processing  |              |            |            |            |                        |           |                       |                 |          |
|                   | 12u                   | Machine learning EG   |              |            |            |            |                        |           |                       |                 |          |
| CU02              | 13x                   | LabVIEW   | 15           | 7,5        |            | 22,5       | 2                      | 9         |                       |                 | X        |
|                   | 20x                   | Introduction to VLSI CAD tools  | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |          |
|                   | 21x                   | VLSI circuits design  | 30           | 15         |            | 45         | 3                      |           |                       | X               | X        |
|                   | 22x                   | VLSI circuits design I: Engineering Design Projects                                 |              | 18         |            | 18         | 1                      |           | C                     |                 |          |
|                   | 23x                   | VLSI circuits design II: Engineering Design Projects                                |              | 18         |            | 18         | 1                      |           | C                     |                 |          |
| CU03              | 24x                   | High level design   | 15           | 7,5        |            | 22,5       | 2                      | 9         |                       |                 | X        |
|                   | 30x                   | Architecture of complex digital integrated circuits                                 | 30           | 15         |            | 45         | 3                      |           |                       | X               | X        |
|                   | 31x                   | Architecture of complex digital integrated circuits I: Engineering Design Projects  |              | 18         |            | 18         | 1                      |           | C                     |                 |          |
|                   | 32x                   | Architecture of complex digital integrated circuits II: Engineering Design Projects |              | 18         |            | 18         | 1                      |           | C                     |                 |          |
|                   | 33x                   | Manufacturing electronic circuits   | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|                   | ---                   | A module to choose from:  | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |          |
|                   | 34t                   | Integrated circuits fabrication   |              |            |            |            |                        |           |                       |                 |          |
| 34u               | Module to be precised |   |              |            |            |            |                        |           |                       |                 |          |
| CU04              | ---                   | A module to choose from:  |              | 22,5       |            | 22,5       | 1                      | 5         | C                     |                 |          |
|                   | 40r                   | English 5   |              |            |            |            |                        |           |                       |                 |          |
|                   | 40s                   | German 2  |              |            |            |            |                        |           |                       |                 |          |
|                   | 40t                   | Chinese 2   |              |            |            |            |                        |           |                       |                 |          |
|                   | 41x                   | Business law  | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |          |
|                   | 42x                   | Project Preparation Week 3rd year   |              | 22,5       |            | 22,5       | 1                      |           | C                     |                 |          |
|                   | 43x                   | Project Management  | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 | X        |
|                   | 44x                   | Professional integration and career development                                     | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |          |
| <b>Semester 2</b> |                       |   |              |            |            |            |                        |           |                       |                 |          |
| CU01              | 60c                   | End of study project  |              |            | 450        | 450        | 30                     | 30        | X                     |                 |          |
|                   |                       | <b>Total</b>  | <b>210</b>   | <b>240</b> | <b>450</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>14</b>             | <b>2</b>        | <b>6</b> |

| Electrical Engineering - Third Year<br>Option 3: Electrical Systems - Semester 1<br>2023-2024 |  |   |              |            |            |            |                        |           |                       |                 |          |
|---|--|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code   | Course Title  | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |  |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 10y  | Design of real time systems   | 15           | 7,5        |            | 22,5       | 2                      | 7         | C                     |                 |          |
|   | 11y  | Embedded and real time systems: Engineering Design Projects           |              | 18         |            | 18         | 1                      |           | C                     |                 |          |
|   | ---  | A module to choose from:  | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|   | 12v  | Multi-resolution analysis   |              |            |            |            |                        |           |                       |                 |          |
|   | 12w  | Control of Power Electronics Semiconductors                           |              |            |            |            |                        |           |                       |                 |          |
| CU02  | 13y  | LabVIEW   | 15           | 7,5        |            | 22,5       | 2                      |           |                       | X               |          |
|   | 20y  | Power electronics II: high frequency energy supply and energy quality | 30           | 15         |            | 45         | 3,5                    |           | X                     | X               |          |
|   | 21y  | Power electronics: Engineering Design Projects                        |              | 18         |            | 18         | 1                      | C         |                       |                 |          |
|   | 22y  | Electric power systems: stability and protection                      | 30           | 15         |            | 45         | 3,5                    |           | X                     | X               |          |
| CU03  | 23y  | Electric power systems: Engineering Design Projects                   |              | 18         |            | 18         | 1                      | C         |                       |                 |          |
|   | 30y  | Advanced Power Converter Controls                                     | 15           | 7,5        |            | 22,5       | 2                      | 9         | C                     |                 |          |
|   | 31y  | CAD modeling of electric fields and actuators                         | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |          |
|   | 32y  | Computer aided design: Engineering Design Projects                    |              | 18         |            | 18         | 1                      |           | C                     |                 |          |
|   | 33y  | Renewable energies  | 30           | 15         |            | 45         | 3                      |           | C                     |                 | X        |
| 34y   | Control of power converters: Engineering Design Projects |   | 18           |            | 18         | 1          | C                      |           |                       |                 |          |
| CU04  | ---  | A module to choose from:  |              | 22,5       |            | 22,5       | 1                      | 5         | C                     |                 |          |
|   | 40r  | English 5   |              |            |            |            |                        |           |                       |                 |          |
|   | 40s  | German 2  |              |            |            |            |                        |           |                       |                 |          |
|   | 40t  | Chinese 2   |              |            |            |            |                        |           |                       |                 |          |
|   | 41y  | Business law  | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |          |
|   | 42y  | Project Preparation Week 3rd year                                     |              | 22,5       |            | 22,5       | 1                      |           | C                     |                 |          |
|   | 43y  | Project Management  | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 | X        |
|   | 44y  | Professional integration and career development                       | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |          |
| Semester 2  |  |   |              |            |            |            |                        |           |                       |                 |          |
| CU01  | 6oc  | End of study project  |              |            | 450        | 450        | 30                     | 30        | X                     |                 |          |
| <b>Total</b>  |  |   | <b>210</b>   | <b>240</b> | <b>450</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>14</b>             | <b>2</b>        | <b>6</b> |



| Industrial Engineering - First Year - Semester 1<br>2023-2024 |      |  |              |            |             |              |                        |           |                       |                 |          |
|---|------|--|--------------|------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title                                   | Course hours |            |             |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |  | Lectures     | Tutorials  | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 10a  | Mathematics for the engineer I                 | 30           | 15         |             | 45           | 3                      | 8         | C                     | X               | X        |
|   | 11a  | Numerical Matrix Analysis                      | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
|   | 12a  | Nonlinear numerical analysis                   | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
|   | 13a  | Project Preparation Week 1st year              | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
| CU02  | 20a  | Solid State Physics                            | 15           | 7,5        |             | 22,5         | 2                      | 8         |                       |                 | X        |
|   | 21a  | Measurements and instrumentation               | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
|   | 22a  | Physics and instrumentation Lab                |              |            | 22,5        | 22,5         | 1                      |           | C                     |                 |          |
|   | 23a  | Industrial processes                           | 30           | 15         |             | 45           | 3                      |           |                       | X               | X        |
| CU03  | 30a  | Procedural programming                         | 30           | 15         |             | 45           | 3                      | 7         | C                     |                 | X        |
|   | 31a  | Opening module: introduction to energy         | 15           | 7,5        |             | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 32a  | Electrical Engineering and Electrical Machines | 24           | 12         | 9           | 45           | 2,5                    |           | C                     |                 | X        |
| CU04  | 40a  | English 1                                      |              | 22,5       |             | 22,5         | 1                      | 7         | C                     |                 |          |
|   | 41a  | French 1                                       | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|   | 42a  | Business Management                            | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|   | 43a  | General economy                                | 30           | 15         |             | 45           | 2                      |           | C                     |                 | X        |
|   | 44a  | Entrepreneurship and innovation                | 15           | 7,5        |             | 22,5         | 2                      |           | C                     |                 |          |
|   |      | <b>Total</b>                                   | <b>279</b>   | <b>162</b> | <b>31,5</b> | <b>472,5</b> | <b>30</b>              | <b>30</b> | <b>11</b>             | <b>2</b>        | <b>9</b> |

| Industrial Engineering - First Year - Semester 2<br>2023-2024 |      |  |              |              |             |              |                        |           |                       |                 |          |
|---|------|--|--------------|--------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title                           | Course hours |              |             |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |  | Lectures     | Tutorials    | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 50a  | Mathematics for the engineer II        | 30           | 15           |             | 45           | 3                      | 8         |                       | X               | X        |
|   | 51a  | Probability                            | 15           | 7,5          |             | 22,5         | 1,5                    |           |                       |                 | X        |
|   | 52a  | Statistics                             | 15           | 7,5          |             | 22,5         | 1,5                    |           |                       |                 | X        |
|   | 53a  | Mini Project in Procedural Programming |              | 7,5          | 15          | 22,5         | 2                      |           | C                     |                 |          |
| CU02  | 60a  | Applied thermodynamics                 | 15           | 7,5          |             | 22,5         | 2                      | 8         | C                     |                 |          |
|   | 61a  | Thermal transfer                       | 15           | 7,5          |             | 22,5         | 2                      |           |                       |                 | X        |
|   | 62a  | Lab Heat transfer/Thermodynamics       |              |              | 22,5        | 22,5         | 1                      |           | C                     |                 |          |
|   | 63a  | Fluid Mechanics                        | 24           | 12           | 9           | 45           | 3                      |           | C                     |                 | X        |
| CU03  | 70a  | Introduction to Industrial Engineering | 7,5          |              | 15          | 22,5         | 2                      | 8         | C                     |                 |          |
|   | 71a  | Operational Research and Optimization  | 30           | 15           |             | 45           | 3                      |           |                       | X               | X        |
|   | ---  | A module to choose from:               | 15           | 7,5          |             | 22,5         | 1,5                    |           |                       |                 | X        |
|   | 72d  | Metallic materials                     |              |              |             |              |                        |           |                       |                 |          |
|   | 72e  | Ceramics and glasses                   |              |              |             |              |                        |           |                       |                 |          |
|   | 72f  | Semiconductors                         |              |              |             |              |                        |           |                       |                 |          |
|   | ---  | A module to choose from:               | 15           | 7,5          |             | 22,5         | 1,5                    |           |                       |                 | X        |
| CU04  | 80a  | English 2                              |              | 22,5         |             | 22,5         | 1                      | 6         | C                     |                 |          |
|   | 81a  | French 2                               | 15           | 7,5          |             | 22,5         | 1                      |           | C                     |                 |          |
|   | 82a  | End of Year Project of the 1st year GI |              | 22,5         |             | 22,5         | 2                      |           | C                     |                 |          |
|   | 83a  | System week                            | 15           | 7,5          |             | 22,5         | 2                      |           | C                     |                 |          |
|   |      | <b>Total</b>                           | <b>211,5</b> | <b>154,5</b> | <b>61,5</b> | <b>427,5</b> | <b>30</b>              | <b>30</b> | <b>9</b>              | <b>2</b>        | <b>8</b> |

| <b>Industrial Engineering - Second Year - Semester 1<br/>2023-2024</b> |      |  |              |              |             |            |                        |           |                       |                 |           |
|--|------|--|--------------|--------------|-------------|------------|------------------------|-----------|-----------------------|-----------------|-----------|
| Course Unit  | Code | Course Title                                   | Course hours |              |             |            | Credits / Coefficients |           | Evaluation mode       |                 |           |
|  |      |  | Lectures     | Tutorials    | PW          | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01   | 10b  | Mechanics of materials                         | 15           | 7,5          |             | 22,5       | 2                      | 10        |                       |                 | X         |
|  | 11b  | Methodology and digital design tools           | 15           |              | 30          | 45         | 3                      |           | C                     |                 |           |
|  | 12b  | Reliability and maintenance                    | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X         |
|  | 13b  | Operations Management I                        | 30           | 15           |             | 45         | 3                      |           |                       | X               | X         |
| CU02   | 20b  | Electronics and industrial processes           | 15           | 7,5          |             | 22,5       | 1,5                    | 6         |                       |                 | X         |
|  | 21b  | Industrial Automation and PLC                  | 15           | 7,5          | 22,5        | 45         | 3                      |           | C                     |                 | X         |
|  | 22b  | Introduction to local networks and supervision | 15           | 7,5          |             | 22,5       | 1,5                    |           |                       |                 | X         |
| CU03   | 30b  | Data Mining                                    | 30           | 15           |             | 45         | 3                      | 9         | C                     |                 | X         |
|  | 31b  | Stochastic process                             | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X         |
|  | 32b  | Data base                                      | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X         |
|  | 33b  | Discrete optimization                          | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X         |
| CU04   | 40b  | English 3                                      |              | 22,5         |             | 22,5       | 1                      | 5         | C                     |                 |           |
|  | 41b  | French 3                                       | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |           |
|  | 42b  | Project Preparation Week 2nd year              |              | 22,5         |             | 22,5       | 1                      |           | C                     |                 |           |
|  | 43b  | Communications and self-management             | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |           |
|  | 44b  | Opening week                                   | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |           |
|  |      | <b>Total</b>                                   | <b>240</b>   | <b>157,5</b> | <b>52,5</b> | <b>450</b> | <b>30</b>              | <b>30</b> | <b>8</b>              | <b>1</b>        | <b>10</b> |

| Industrial Engineering - Second Year - Semester 2<br>2023-2024 |      |  |              |            |            |            |                        |           |                       |                 |          |
|--|------|--|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit  | Code | Course Title                           | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |      |  | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 50b  | Simulation of industrial systems       | 15           | 7,5        | 22,5       | 45         | 3                      | 10        | C                     |                 | X        |
|  | 51b  | Operations Management II               | 30           | 15         |            | 45         | 3,5                    |           | C                     |                 | X        |
|  | 52b  | Quality management and process control | 30           | 15         |            | 45         | 3,5                    |           | C                     |                 |          |
| CU02   | 60b  | Thermal machines                       | 21           | 9          | 15         | 45         | 3                      | 8         | C                     |                 | X        |
|  | 61b  | Mechanical production processes        | 15           |            | 7,5        | 22,5       | 2                      |           | C                     |                 |          |
|  | ---  | A module to choose from:               | 30           | 15         |            | 45         | 3                      |           | C                     |                 |          |
|  | 62k  | Renewable energies                     |              |            |            |            |                        |           |                       |                 |          |
|  | 62l  | Green hydrogen                         |              |            |            |            |                        |           |                       |                 |          |
|  | 62m  | Energetic efficiency                   |              |            |            |            |                        |           |                       |                 |          |
|  | 62n  | Life cycle analysis of energy systems  |              |            |            |            |                        |           |                       |                 |          |
| CU03   | ---  | A module to choose from:               |              | 22,5       |            | 22,5       | 1                      | 8         | C                     |                 |          |
|  | 70k  | English 4                              |              |            |            |            |                        |           |                       |                 |          |
|  | 70l  | German I                               |              |            |            |            |                        |           |                       |                 |          |
|  | 70m  | Chinese 1                              |              |            |            |            |                        |           |                       |                 |          |
|  | 71b  | Cost accounting                        | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|  | 72b  | Management control                     | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|  | 73b  | Financial management                   | 30           | 15         |            | 45         | 3                      |           |                       | X               | X        |
| CU04   | 80b  | End of Year Project of the 2nd year GI |              |            | 90         | 90         | 4                      | 4         | C                     |                 |          |
|  |      | <b>Total</b>                           | <b>201</b>   | <b>114</b> | <b>135</b> | <b>450</b> | <b>30</b>              | <b>30</b> | <b>8</b>              | <b>1</b>        | <b>6</b> |

| Industrial Engineering - Third Year - Semester 1<br>2023-2024 |   |   |              |            |            |            |                        |           |                       |                 |      |  |  |          |  |
|---|---|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|------|--|--|----------|--|
| Course Unit   | Code  | Course Title                                  | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |      |  |  |          |  |
|   |   |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam |  |  |          |  |
| CU01  | ---   | <b>Option Supply Chain Management</b>         |              |            |            |            |                        |           |                       |                 |      |  |  |          |  |
|   | 10r   | Advanced flow control models                  | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 |      |  |  | X        |  |
|   | 10s   | Process engineering                           | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |      |  |  |          |  |
|   | 10t   | Machine Learning                              | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |      |  |  |          |  |
|   | 10u   | Artificial intelligence IE                    | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |      |  |  |          |  |
|   | 10v   | Supply chain management 2                     | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |      |  |  |          |  |
|   | ---   | <b>Option Data Science for Smart Industry</b> |              |            |            |            |                        |           |                       |                 |      |  |  |          |  |
|   | 11r   | Machine Learning                              | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |      |  |  |          |  |
|   | 11s   | Artificial intelligence and applications      | 30           | 15         |            | 45         | 3                      |           | C                     |                 |      |  |  |          |  |
|   | 11t   | Introduction to Big Data                      | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |      |  |  |          |  |
|   | 11u   | Digital twin for smart manufacturing          | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |      |  |  |          |  |
|   | ---   | <b>Option Banking Finance</b>                 |              |            |            |            |                        |           |                       |                 |      |  |  |          |  |
|   | 12r   | Introduction to banking finance               | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 |      |  |  | X        |  |
|   | 12s   | Process engineering                           | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |      |  |  |          |  |
|   | 12t   | Numerical methods in finance                  | 30           | 15         |            | 45         | 3                      |           | C                     |                 |      |  |  | X        |  |
|   | 12u   | Machine Learning                              | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |      |  |  |          |  |
|   | ---   | <b>Option Economy and Energy</b>              |              |            |            |            |                        |           |                       |                 |      |  |  |          |  |
|   | 13r   | Market and energy policy                      | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |      |  |  |          |  |
|   | 13s   | Optimization of energy systems                | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |      |  |  |          |  |
| 13t   | Energy distribution                             | 15  | 7,5          |            | 22,5       | 1,5        |                        | C         |                       |                 |      |  |  |          |  |
| 13u   | Carbon market                                   | 15  | 7,5          |            | 22,5       | 1,5        |                        | C         |                       |                 |      |  |  |          |  |
| 13v   | Smart technologies                              | 15  | 7,5          |            | 22,5       | 1,5        |                        | C         |                       |                 |      |  |  |          |  |
| CU02  | 20c   | Decision theory                               | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 |      |  |  | X        |  |
|   | 21c   | Lean 4.0                                      | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 |      |  |  | X        |  |
|   | 22c   | Supply chain management                       | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 |      |  |  | X        |  |
|   | 23c   | Information Systems Engineering               | 22,5         | 7,5        | 15         | 45         | 3                      |           | C                     |                 |      |  |  | X        |  |
| CU03  | 30c   | Optimization and energy strategy              | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |      |  |  |          |  |
|   | 31c   | Business strategy/E-business                  | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |      |  |  |          |  |
|   | 32c   | Industrial and digital marketing              | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |      |  |  |          |  |
|   | 33c   | Integrated ERP course                         | 22,5         | 7,5        | 15         | 45         | 3                      |           | C                     |                 |      |  |  |          |  |
| CU04  | ---   | A module to choose from:                      |              | 22,5       |            | 22,5       | 1                      |           | C                     |                 |      |  |  |          |  |
|   | 40r   | English 5                                     |              |            |            |            |                        |           |                       |                 |      |  |  |          |  |
|   | 40s   | German 2                                      |              |            |            |            |                        |           |                       |                 |      |  |  |          |  |
|   | 40t   | Chinese 2                                     |              |            |            |            |                        |           |                       |                 |      |  |  |          |  |
|   | 41c   | Business law                                  | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |      |  |  |          |  |
|   | 42c   | Project Preparation Week 3rd year             |              | 22,5       |            | 22,5       | 1                      |           | C                     |                 |      |  |  |          |  |
|   | 43c   | Project management                            | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 |      |  |  | X        |  |
| 44c   | Professional integration and career development | 15  | 7,5          |            | 22,5       | 1          |                        | C         |                       |                 |      |  |  |          |  |
| <b>Semester 2</b>   |   |   |              |            |            |            |                        |           |                       |                 |      |  |  |          |  |
| CU01  | 60c   | End of study project                          |              |            | 450        | 450        | 30                     | 30        | X                     |                 |      |  |  |          |  |
|   |   | <b>Total</b>                                  | <b>255</b>   | <b>165</b> | <b>480</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>26</b>             | <b>0</b>        |      |  |  | <b>8</b> |  |

## Modelling For Industry And Services - First Year - Semester 1 2023-2024

| Course Unit | Code | Course Title                           | Course hours |              |             |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|-------------|------|--|--------------|--------------|-------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
|             |      |  | Lectures     | Tutorials    | PW          | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01        | 10a  | Mathematics for the engineer I         | 30           | 15           |             | 45         | 3                      | 8         | C                     | X               | X        |
|             | 11a  | Numerical Matrix Analysis              | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X        |
|             | 12a  | Nonlinear numerical analysis           | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X        |
|             | 13a  | Project Preparation Week 1st year      | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |          |
| CU02        | 20a  | Continuum mechanics                    | 30           | 15           |             | 45         | 3,5                    | 10        |                       | X               | X        |
|             | 21a  | Numerical electronics                  | 30           | 15           |             | 45         | 3,5                    |           |                       | X               | X        |
|             | 22a  | Measurements and instrumentation       | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X        |
|             | 23a  | Physics and instrumentation Lab        |              |              | 22,5        | 22,5       | 1                      |           | C                     |                 |          |
| CU03        | 30a  | Procedural programming                 | 30           | 15           |             | 45         | 3                      | 6         | C                     |                 | X        |
|             | 31a  | Mini Project in Procedural Programming |              | 7,5          | 15          | 22,5       | 2                      |           | C                     |                 |          |
|             | 32a  | Business Management                    | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |          |
| CU04        | 40a  | English 1                              |              | 22,5         |             | 22,5       | 1                      | 6         | C                     |                 |          |
|             | 41a  | French 1                               | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |          |
|             | 42a  | History of science                     |              | 22,5         |             | 22,5       | 1                      |           |                       |                 | X        |
|             | 43a  | Communication Techniques Workshop 1    | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |          |
|             | 44a  | Bibliographic research methods         |              | 22,5         |             | 22,5       | 2                      |           | C                     |                 |          |
|             |      | <b>Total</b>                           | <b>225</b>   | <b>187,5</b> | <b>37,5</b> | <b>450</b> | <b>30</b>              | <b>30</b> | <b>10</b>             | <b>3</b>        | <b>8</b> |

| Modelling For Industry And Services - First Year - Semester 2<br>2023-2024 |      |                                       |              |            |             |              |                        |           |                       |                 |          |
|--|------|---------------------------------------|--------------|------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit  | Code | Course Title                          | Course hours |            |             |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |      |                                       | Lectures     | Tutorials  | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 50a  | Mathematics for the engineer II       | 30           | 15         |             | 45           | 3                      | 8         |                       | X               | X        |
|  | 51a  | Probability                           | 15           | 7,5        |             | 22,5         | 1,5                    |           |                       |                 | X        |
|  | 52a  | Statistics                            | 15           | 7,5        |             | 22,5         | 1,5                    |           |                       |                 | X        |
|  | 53a  | Probability Project                   |              |            | 22,5        | 22,5         | 2                      |           | C                     |                 |          |
| CU02   | 60a  | Differential equations and automatics | 15           | 7,5        |             | 22,5         | 2                      | 9         |                       |                 | X        |
|  | 61a  | Digital signal processing             | 30           | 15         |             | 45           | 3                      |           |                       | X               | X        |
|  | 62a  | DSP mini-project                      |              | 7,5        | 15          | 22,5         | 2                      |           | C                     |                 |          |
|  | 63a  | Numerical Analysis Mini Project       |              | 7,5        | 15          | 22,5         | 2                      |           | C                     |                 |          |
| CU03   | 70a  | Quantum mechanics                     | 15           | 7,5        |             | 22,5         | 2                      | 7         |                       |                 | X        |
|  | 71a  | Fluid Mechanics                       | 24           | 12         | 9           | 45           | 3                      |           |                       | X               | X        |
|  | 72a  | System week                           | 15           | 7,5        |             | 22,5         | 2                      |           | C                     |                 |          |
| CU04   | 80a  | English 2                             |              | 22,5       |             | 22,5         | 1                      | 6         | C                     |                 |          |
|  | 81a  | French 2                              | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|  | 82a  | General economy                       | 30           | 15         |             | 45           | 2                      |           | C                     |                 | X        |
|  | 83a  | Entrepreneurship and innovation       |              | 22,5       |             | 22,5         | 2                      |           | C                     |                 |          |
|  |      | <b>Total</b>                          | <b>204</b>   | <b>162</b> | <b>61,5</b> | <b>427,5</b> | <b>30</b>              | <b>30</b> | <b>8</b>              | <b>3</b>        | <b>8</b> |

| Modelling For Industry And Services - Second Year - Semester 1<br>2023-2024 |      |   |              |            |            |              |                        |           |                       |                 |           |
|---|------|---|--------------|------------|------------|--------------|------------------------|-----------|-----------------------|-----------------|-----------|
| Course Unit   | Code | Course Title                                      | Course hours |            |            |              | Credits / Coefficients |           | Evaluation mode       |                 |           |
|   |      |   | Lectures     | Tutorials  | PW         | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01  | 10b  | Statistics I                                      | 30           | 15         |            | 45           | 3                      | 8         | C                     |                 | X         |
|   | 11b  | Stochastic calculation                            | 30           | 15         |            | 45           | 3                      |           |                       | X               | X         |
|   | 12b  | Complex variable functions                        | 15           | 7,5        |            | 22,5         | 2                      |           |                       |                 | X         |
| CU02  | 20b  | Optimization                                      | 30           | 15         |            | 45           | 3                      | 9         |                       | X               | X         |
|   | 21b  | Opening week                                      | 15           | 7,5        |            | 22,5         | 1                      |           | C                     |                 |           |
|   | 22b  | Operational Research and Optimization             | 30           | 15         |            | 45           | 3                      |           |                       | X               | X         |
| CU03  | 23b  | Finite elements 1                                 | 15           | 7,5        |            | 22,5         | 2                      | 8         |                       |                 | X         |
|   | 30b  | Object-oriented programming and Java              | 30           | 7,5        | 7,5        | 45           | 3                      |           | C                     |                 | X         |
|   | ---  | <b>Option Finance</b>                             |              |            |            |              |                        |           |                       |                 |           |
|   | 31k  | Markov chains                                     | 15           | 7,5        |            | 22,5         | 1,5                    |           |                       |                 | X         |
|   | 31l  | Discrete martingales                              | 15           | 7,5        |            | 22,5         | 1,5                    |           |                       |                 | X         |
|   | 31m  | Actuarial I: Non life insurance                   | 15           | 7,5        |            | 22,5         | 2                      |           |                       |                 | X         |
|   | ---  | <b>Option Modeling</b>                            |              |            |            |              |                        |           |                       |                 |           |
| CU04  | 32k  | Automatic control                                 | 30           | 15         |            | 45           | 3                      |           | X                     | X               |           |
|   | 32l  | Functional analysis                               | 15           | 7,5        |            | 22,5         | 2                      |           |                       | X               |           |
| CU04  | 40b  | English 3   |              | 22,5       |            | 22,5         | 1                      | 5         | C                     |                 |           |
|   | 41b  | French 3  | 15           | 7,5        |            | 22,5         | 1                      |           | C                     |                 |           |
|   | 42b  | Sociology   |              | 22,5       |            | 22,5         | 1                      |           |                       |                 | X         |
|   | 43b  | Introduction to accounting and financial analysis | 15           | 7,5        |            | 22,5         | 1                      |           |                       |                 | X         |
|   | 44b  | Project Preparation Week 2nd year                 |              | 22,5       |            | 22,5         | 1                      |           | C                     |                 |           |
|   |      | <b>Total</b>                                      | <b>270</b>   | <b>195</b> | <b>7,5</b> | <b>472,5</b> | <b>30</b>              | <b>30</b> | <b>6</b>              | <b>4</b>        | <b>14</b> |



## Modelling For Industry And Services - Second Year - Semester 2 2023-2024

| Course Unit  | Code                     | Course Title                              | Course hours |            |              |              | Credits / Coefficients |    | Evaluation mode       |                 |          |
|--------------|--------------------------|---|--------------|------------|--------------|--------------|------------------------|----|-----------------------|-----------------|----------|
|              |                          |   | Lectures     | Tutorials  | PW           | Total        | Module                 | CU | Continuous assessment | Supervised Test | Exam     |
| CU01         | 50b                      | Data base and Lab                         | 15           | 7,5        | 22,5         | 45           | 3                      | 9  | C                     |                 | X        |
|              | 51b                      | Analysis of the data                      | 15           | 7,5        |              | 22,5         | 2                      |    |                       |                 | X        |
|              | 52b                      | Probabilistic machine learning            | 15           | 7,5        |              | 22,5         | 2                      |    |                       |                 | X        |
|              | 53b                      | Strategy and business creation            | 15           | 7,5        |              | 22,5         | 2                      |    | C                     |                 |          |
| CU02         | ---                      | <b>Option Finance</b>                     |              |            |              |              |                        | 9  |                       |                 |          |
|              | 60k                      | Foundations of finance I                  | 30           | 15         |              | 45           | 3,5                    |    | C                     |                 | X        |
|              | 60l                      | Actuarial II: Non life insurance          | 30           | 15         |              | 45           | 3,5                    |    |                       | X               | X        |
|              | 60m                      | Discrete models in finance                | 15           | 7,5        |              | 22,5         | 2                      |    |                       |                 | X        |
|              | ---                      | <b>Option Modeling</b>                    |              |            |              |              |                        |    |                       |                 |          |
|              | 61k                      | Advanced Scientific Computing             | 21           |            | 24           | 45           | 3                      |    | C                     |                 | X        |
|              | 61l                      | Interaction between fluids and structures | 15           | 7,5        |              | 22,5         | 2                      |    |                       |                 | X        |
|              | 61m                      | Compressible flow                         | 15           | 7,5        |              | 22,5         | 2                      |    |                       |                 | X        |
| CU03         | 61n                      | Thermal transfer                          | 15           | 7,5        |              | 22,5         | 2                      |    |                       | X               |          |
|              | 70b                      | Statistics II                             | 30           | 15         |              | 45           | 3,5                    | C  |                       | X               |          |
|              | ---                      | <b>Option Finance</b>                     |              |            |              |              |                        | 6  |                       |                 |          |
|              | 71k                      | Econometrics                              | 15           | 7,5        |              | 22,5         | 2,5                    |    |                       |                 | X        |
| ---          | <b>Option Modeling</b>   |   |              |            |              |              |                        |    |                       |                 |          |
| 72k          | Digital image processing | 15  | 7,5          |            | 22,5         | 2,5          | C                      |    |                       |                 |          |
| CU04         | ---                      | A module to choose from:                  |              | 22,5       |              | 22,5         | 1                      | C  |                       |                 |          |
|              | 80k                      | English 4                                 |              |            |              |              |                        | 6  |                       |                 |          |
|              | 80l                      | German I                                  |              |            |              |              |                        |    |                       |                 |          |
|              | 80m                      | Chinese 1                                 |              |            |              |              |                        |    |                       |                 |          |
|              | 81b                      | Communication Techniques Workshop 2       | 15           | 7,5        |              | 22,5         | 1                      |    | C                     |                 |          |
|              | 82b                      | End of Year Project of the 2nd year MINDS |              |            | 90           | 90           | 4                      |    | C                     |                 |          |
| <b>Total</b> |                          |   | <b>195</b>   | <b>120</b> | <b>112,5</b> | <b>427,5</b> | <b>30</b>              |    | <b>30</b>             | <b>9</b>        | <b>1</b> |

## Modelling For Industry And Services - Third Year Option M: Modelisation and data science - Semester 1 2023-2024

| Course Unit       | Code                                    | Course Title  | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |           |
|-------------------|---|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|-----------|
|                   |   |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01              | 10x                                     | Flow modeling in porous media                         | 15           | 7,5        |            | 22,5       | 2                      | 7         |                       |                 | X         |
|                   | 11x                                     | Industrial fluid mechanics                            | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
|                   | 12x                                     | Modeling for life sciences                            | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
|                   | 13x                                     | Nanomaterials   | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X         |
| CU02              | 20x                                     | Data Mining 1   | 15           | 7,5        |            | 22,5       | 1,5                    | 9         |                       |                 | X         |
|                   | 21x                                     | Introduction to cloud computing                       | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
|                   | 22x                                     | Parallel and distributed programming                  | 30           | 15         |            | 45         | 3                      |           |                       | X               | X         |
|                   | 23x                                     | Introduction to Big Data                              | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
|                   | 24x                                     | Security of Information Systems and Computer Networks | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
| CU03              | 30x                                     | Deep learning   | 15           | 7,5        |            | 22,5       | 1,5                    | 5         | C                     |                 |           |
|                   | 31x                                     | Optimization applied to machine learning              | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |           |
|                   | 32x                                     | Variational methods in image processing               | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |           |
| CU04              | ---                                     | A module to choose from:                              |              | 22,5       |            | 22,5       | 1                      | 9         | C                     |                 |           |
|                   | 40r                                     | English 5   |              |            |            |            |                        |           |                       |                 |           |
|                   | 40s                                     | German 2  |              |            |            |            |                        |           |                       |                 |           |
|                   | 40t                                     | Chinese 2   |              |            |            |            |                        |           |                       |                 |           |
|                   | 41x                                     | Business law  | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |           |
|                   | 42x                                     | Project Preparation Week 3rd year                     |              | 22,5       |            | 22,5       | 1                      |           | C                     |                 |           |
|                   | 43x                                     | Project Management                                    | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 | X         |
|                   | 44x                                     | Professional integration and career development       | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |           |
| 45x               | Information system and decision support | 15  | 7,5          |            | 22,5       | 2          |                        |           | X                     |                 |           |
|                   | 46x                                     | Project management 2                                  |              | 22,5       |            | 22,5       | 2                      | C         |                       |                 |           |
| <b>Semester 2</b> |   |   |              |            |            |            |                        |           |                       |                 |           |
| CU01              | 60c                                     | End of study project                                  |              |            | 450        | 450        | 30                     | 30        | X                     |                 |           |
|                   |   | <b>Total</b>  | <b>255</b>   | <b>195</b> | <b>450</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>9</b>              | <b>1</b>        | <b>11</b> |

| <b>Modelling For Industry And Services - Third Year</b><br><b>Option F: Finance and actuarial - Semester 1</b><br><b>2023-2024</b> |   |   |              |            |            |            |                        |           |                       |                 |           |
|--|---|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|-----------|
| Course Unit  | Code                                    | Course Title                                    | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |           |
|  |   |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01   | 10c                                     | Stochastic models in finance                    | 30           | 15         |            | 45         | 3,5                    | 7         | C                     |                 | X         |
|  | 11c                                     | Numerical methods in finance                    | 30           | 15         |            | 45         | 3,5                    |           | C                     |                 | X         |
| CU02   | 20c                                     | Introduction to Big Data                        | 15           | 7,5        |            | 22,5       | 1,5                    | 9         |                       |                 | X         |
|  | 21c                                     | Parallel and distributed programming            | 30           | 15         |            | 45         | 3                      |           |                       | X               | X         |
|  | 22c                                     | Deep learning                                   | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |           |
|  | 23c                                     | Optimization applied to machine learning        | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |           |
|  | 24c                                     | Data Mining 1                                   | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
| CU03   | 30c                                     | Credit Risk Management                          | 15           | 7,5        |            | 22,5       | 1,5                    | 7         | C                     |                 |           |
|  | 31c                                     | Risk measure                                    | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X         |
|  | 32c                                     | Actuarial: Life insurance                       | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X         |
|  | 33c                                     | Introduction to banking finance                 | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
| CU04   | ---                                     | A module to choose from:                        |              | 22,5       |            | 22,5       | 1                      | 7         | C                     |                 |           |
|  | 40r                                     | English 5                                       |              |            |            |            |                        |           |                       |                 |           |
|  | 40s                                     | German 2  |              |            |            |            |                        |           |                       |                 |           |
|  | 40t                                     | Chinese 2                                       |              |            |            |            |                        |           |                       |                 |           |
|  | 41c                                     | Business law                                    | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |           |
|  | 42c                                     | Project Preparation Week 3rd year               | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |           |
|  | 43c                                     | Project Management                              | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 | X         |
|  | 44c                                     | Professional integration and career development |              | 22,5       |            | 22,5       | 1                      |           | C                     |                 |           |
| 45c  | Information system and decision support |   | 22,5         |            | 22,5       | 2          |                        |           | X                     |                 |           |
| <b>Semester 2</b>  |   |   |              |            |            |            |                        |           |                       |                 |           |
| CU01   | 60c                                     | End of study project                            |              |            | 450        | 450        | 30                     | 30        | X                     |                 |           |
|  |   | <b>Total</b>                                    | <b>255</b>   | <b>195</b> | <b>450</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>10</b>             | <b>1</b>        | <b>10</b> |

| Mechanical Engineering - First Year - Semester 1<br>2023-2024 |      |                                   |              |              |             |              |                        |           |                       |                 |           |
|---|------|-----------------------------------|--------------|--------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|-----------|
| Course Unit   | Code | Course Title                      | Course hours |              |             |              | Credits / Coefficients |           | Evaluation mode       |                 |           |
|   |      |                                   | Lectures     | Tutorials    | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01  | 10a  | Mathematics for the engineer I    | 30           | 15           |             | 45           | 3                      | 8         | C                     | X               | X         |
|   | 11a  | Numerical Matrix Analysis         | 15           | 7,5          |             | 22,5         | 2                      |           |                       |                 | X         |
|   | 12a  | Nonlinear numerical analysis      | 15           | 7,5          |             | 22,5         | 2                      |           |                       |                 | X         |
|   | 13a  | Project Preparation Week 1st year | 15           | 7,5          |             | 22,5         | 1                      |           | C                     |                 |           |
| CU02  | 20a  | Continuum mechanics               | 30           | 15           |             | 45           | 3                      | 8         |                       | X               | X         |
|   | 21a  | Rigid solid mechanics             | 22,5         | 10,5         |             | 33           | 2,5                    |           |                       | X               | X         |
|   | 22a  | Thermodynamics                    | 22,5         | 10,5         |             | 33           | 2,5                    |           | C                     |                 | X         |
| CU03  | 30a  | Materials 1                       | 15           | 7,5          | 10,5        | 33           | 2                      | 9         | C                     |                 | X         |
|   | 31a  | Design technology and analysis    | 30           | 15           |             | 45           | 3                      |           |                       | X               | X         |
|   | 32a  | Conventional machining            | 15           | 7,5          | 22,5        | 45           | 2,5                    |           | C                     |                 | X         |
|   | 33a  | Metrology and quality control     | 7,5          | 7,5          | 7,5         | 22,5         | 1,5                    |           | C                     |                 | X         |
| CU04  | 40a  | English 1                         |              | 22,5         |             | 22,5         | 1                      | 5         | C                     |                 |           |
|   | 41a  | French 1                          | 15           | 7,5          |             | 22,5         | 1                      |           | C                     |                 |           |
|   | 42a  | Business Management               | 15           | 7,5          |             | 22,5         | 1                      |           | C                     |                 |           |
|   | 43a  | General economy                   | 30           | 15           |             | 45           | 2                      |           | C                     |                 | X         |
|   |      | <b>Total</b>                      | <b>277,5</b> | <b>163,5</b> | <b>40,5</b> | <b>481,5</b> | <b>30</b>              | <b>30</b> | <b>10</b>             | <b>4</b>        | <b>11</b> |

| Mechanical Engineering - First Year - Semester 2<br>2023-2024 |      |  |              |              |             |              |                        |           |                       |                 |          |
|---|------|--|--------------|--------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title                           | Course hours |              |             |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |  | Lectures     | Tutorials    | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 50a  | Mathematics for the engineer II        | 30           | 15           |             | 45           | 3                      | 10        |                       | X               | X        |
|   | 51a  | System week                            | 15           | 7,5          |             | 22,5         | 2                      |           | C                     |                 |          |
|   | 52a  | Procedural programming                 | 30           | 15           |             | 45           | 3                      |           | C                     |                 | X        |
|   | 53a  | Mini Project in Procedural Programming |              | 7,5          | 15          | 22,5         | 2                      |           | C                     |                 |          |
| CU02  | 60a  | Mechanical vibration 1                 | 15           | 7,5          |             | 22,5         | 2                      | 7         |                       |                 | X        |
|   | 61a  | Materials 2                            | 12           | 4,5          | 6           | 22,5         | 2                      |           | C                     |                 | X        |
|   | 62a  | Measurements and instrumentation       | 15           | 7,5          |             | 22,5         | 2                      |           |                       |                 | X        |
|   | 63a  | Physics and instrumentation Lab        |              |              | 22,5        | 22,5         | 1                      |           | C                     |                 |          |
| CU03  | 70a  | Material resistance                    | 30           | 15           |             | 45           | 3                      | 9         |                       | X               | X        |
|   | 71a  | Technology office                      | 7,5          | 15           |             | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 72a  | Mechanism design and analysis          | 30           | 15           |             | 45           | 3                      |           | C                     |                 | X        |
|   | 73a  | Welding processes                      | 15           | 7,5          |             | 22,5         | 1,5                    |           | C                     |                 |          |
| CU04  | 80a  | English 2                              |              | 22,5         |             | 22,5         | 1                      | 4         | C                     |                 |          |
|   | 81a  | French 2                               | 15           | 7,5          |             | 22,5         | 1                      |           | C                     |                 |          |
|   | 82a  | Entrepreneurship and innovation        | 15           | 7,5          |             | 22,5         | 2                      |           | C                     |                 |          |
|   |      | <b>Total</b>                           | <b>229,5</b> | <b>154,5</b> | <b>43,5</b> | <b>427,5</b> | <b>30</b>              | <b>30</b> | <b>11</b>             | <b>2</b>        | <b>7</b> |

| Mechanical Engineering - Second Year - Semester 1<br>2023-2024 |                                     |                                   |              |              |           |            |                        |           |                       |                 |           |
|--|-------------------------------------|-----------------------------------|--------------|--------------|-----------|------------|------------------------|-----------|-----------------------|-----------------|-----------|
| Course Unit  | Code                                | Course Title                      | Course hours |              |           |            | Credits / Coefficients |           | Evaluation mode       |                 |           |
|  |                                     |                                   | Lectures     | Tutorials    | PW        | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01   | 10b                                 | Mechanical links design           | 30           | 15           |           | 45         | 3                      | 9         |                       | X               | X         |
|  | 11b                                 | CAD: Computer Aided Design        | 30           | 15           |           | 45         | 3                      |           | C                     |                 | X         |
|  | 12b                                 | BM: Manufacturing Analysis        | 22,5         | 22,5         |           | 45         | 3                      |           |                       | X               | X         |
| CU02   | 20b                                 | Heat transfer                     | 15           | 7,5          |           | 22,5       | 2                      | 9         |                       |                 | X         |
|  | 21b                                 | Mechanics of fluids GM            | 30           | 15           |           | 45         | 3                      |           |                       | X               | X         |
|  | 22b                                 | Opening week                      | 15           | 7,5          |           | 22,5       | 1                      |           | C                     |                 |           |
|  | 23b                                 | Probability                       | 15           | 7,5          |           | 22,5       | 1,5                    |           |                       |                 | X         |
| CU03   | 24b                                 | Statistics                        | 15           | 7,5          |           | 22,5       | 1,5                    |           |                       | X               |           |
|  | 30b                                 | Mechanical vibration 2            | 15           | 7,5          |           | 22,5       | 1,5                    | 9         |                       |                 | X         |
|  | 31b                                 | Materials exploitation            | 15           | 7,5          |           | 22,5       | 1,5                    |           |                       |                 | X         |
|  | 32b                                 | Finite elements                   | 30           | 15           |           | 45         | 3                      |           |                       | X               | X         |
|  | 33b                                 | Practicum: Applied mechanics      |              |              | 22,5      | 22,5       | 1                      |           | C                     |                 |           |
| 34b  | Electrical circuits and measurments | 15                                | 7,5          | 10,5         | 33        | 2          | C                      |           |                       | X               |           |
| CU04   | 40b                                 | English 3                         |              | 22,5         |           | 22,5       | 1                      | 3         | C                     |                 |           |
|  | 41b                                 | French 3                          | 15           | 7,5          |           | 22,5       | 1                      |           | C                     |                 |           |
|  | 42b                                 | Project Preparation Week 2nd year |              | 22,5         |           | 22,5       | 1                      |           | C                     |                 |           |
|  |                                     | <b>Total</b>                      | <b>262,5</b> | <b>187,5</b> | <b>33</b> | <b>483</b> | <b>30</b>              | <b>30</b> | <b>7</b>              | <b>4</b>        | <b>11</b> |

## Mechanical Engineering - Second Year - Semester 2 2023-2024

| Course Unit  | Code | Course Title                                      | Course hours |            |              |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|--------------|------|---|--------------|------------|--------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
|              |      |   | Lectures     | Tutorials  | PW           | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01         | 50b  | Mechanical transmissions design                   | 30           | 15         |              | 45           | 3                      | 8         | C                     |                 | X        |
|              | 51b  | Machine theory                                    | 22,5         | 10,5       |              | 33           | 3                      |           |                       | X               | X        |
|              | 52b  | Design office                                     | 7,5          | 15         |              | 22,5         | 2                      |           | C                     |                 |          |
| CU02         | 60b  | Non conventional machining                        | 15           | 7,5        | 10,5         | 33           | 3                      | 8         | C                     |                 | X        |
|              | 61b  | Metal forming processes                           | 15           | 7,5        | 10,5         | 33           | 3                      |           | C                     |                 |          |
|              | ---  | A module to choose from:                          | 15           | 7,5        |              | 22,5         | 2                      |           | C                     |                 |          |
|              | 62k  | Elastoplasticity of materials and structures      |              |            |              |              |                        |           |                       |                 |          |
|              | 62l  | Computational mechanics office                    |              |            |              |              |                        |           |                       |                 |          |
|              | 62m  | Lean Management                                   |              |            |              |              |                        |           |                       |                 |          |
| CU03         | 70b  | Automatic control                                 | 15           | 7,5        |              | 22,5         | 2                      | 8         |                       |                 | X        |
|              | 71b  | Electric machine                                  | 15           | 7,5        |              | 22,5         | 2                      |           |                       |                 | X        |
|              | 72b  | Practicum: Eelectrical machines/Automatic control |              |            | 22,5         | 22,5         | 1                      |           | C                     |                 |          |
|              | 73b  | Operational Research and Optimization             | 30           | 15         |              | 45           | 3                      |           |                       | X               | X        |
| CU04         | ---  | A module to choose from:                          |              | 22,5       |              | 22,5         | 1                      | 6         | C                     |                 |          |
|              | 80k  | English 4   |              |            |              |              |                        |           |                       |                 |          |
|              | 80l  | German I  |              |            |              |              |                        |           |                       |                 |          |
|              | 80m  | Chinese 1   |              |            |              |              |                        |           |                       |                 |          |
|              | 81b  | Communications and self-management                | 15           | 7,5        |              | 22,5         | 1                      |           | C                     |                 |          |
|              | 82b  | End of Year Project of the 2nd year GM            |              |            | 90           | 90           | 4                      |           | C                     |                 |          |
| <b>Total</b> |      |   | <b>180</b>   | <b>123</b> | <b>133,5</b> | <b>436,5</b> | <b>30</b>              | <b>30</b> | <b>9</b>              | <b>2</b>        | <b>6</b> |

| Mechanical Engineering - Third Year - Semester 1<br>2023-2024 |  |  |              |              |            |              |                        |           |                       |                 |           |   |
|---|--|--|--------------|--------------|------------|--------------|------------------------|-----------|-----------------------|-----------------|-----------|---|
| Course Unit   | Code   | Course Title   | Course hours |              |            |              | Credits / Coefficients |           | Evaluation mode       |                 |           |   |
|   |  |  | Lectures     | Tutorials    | PW         | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |   |
| CU01  | 10c  | Product development office                               | 22,5         | 22,5         |            | 45           | 3                      | 8         | C                     |                 |           |   |
|   | 11c  | Thermal machines 1                                       | 15           | 7,5          | 10,5       | 33           | 2                      |           | C                     | X               | X         |   |
|   | 12c  | Power electronics and Machine command                    | 15           | 7,5          |            | 22,5         | 1                      |           |                       |                 | X         |   |
|   | 13c  | Industrial automation ME                                 | 15           | 7,5          |            | 22,5         | 1                      |           |                       |                 | X         |   |
|   | 14c  | Practicum: Power electronics/Industrial automation       |              |              | 22,5       | 22,5         | 1                      |           | C                     |                 |           |   |
| CU02  | 20c  | Computer Aided Manufacturing                             | 15           | 7,5          |            | 22,5         | 2                      | 7         |                       |                 | X         |   |
|   | 21c  | Maintenance technics and management                      | 15           | 7,5          |            | 22,5         | 2                      |           |                       |                 | X         |   |
|   | 22c  | Production and stocks management                         | 22,5         | 22,5         |            | 45           | 3                      |           |                       | X               | X         |   |
| CU03  | ---  | A module to choose from the list L1:                     | 15           | 7,5          |            | 22,5         | 2                      | 10        |                       |                 | X         |   |
|   | 30r  | Vibration of industrial systems                          |              |              |            |              |                        |           |                       |                 |           |   |
|   | 30s  | Multiphysics modeling of materials behavior              |              |              |            |              |                        |           |                       |                 |           |   |
|   | 30t  | Reliability and industrial quality                       |              |              |            |              |                        |           |                       |                 |           |   |
|   | ---  | A module to choose from the list L2:                     | 15           | 7,5          |            | 22,5         | 2                      |           |                       |                 | X         |   |
|   | 31r  | Industrial thermal systems                               |              |              |            |              |                        |           |                       |                 |           |   |
|   | 31s  | Radiance   |              |              |            |              |                        |           |                       |                 |           |   |
|   | 31t  | Nanotechnology in ME                                     |              |              |            |              |                        |           |                       |                 |           |   |
|   | ---  | A module to choose from the list L3:                     | 15           | 7,5          |            | 22,5         | 2                      |           |                       | C               |           | X |
|   | 32r  | Fundamentals and applications of finite element analysis |              |              |            |              |                        |           |                       | C               |           |   |
|   | 32s  | Mechanics of composite materials                         |              |              |            |              |                        |           |                       |                 |           |   |
|   | 32t  | Project profitability analysis                           |              |              |            |              |                        |           |                       | C               |           |   |
|   | ---  | A module to choose from the list L4:                     | 15           | 7,5          |            | 22,5         | 2                      |           |                       | C               |           |   |
|   | 33r  | CAD and Reverse Engineering                              |              |              |            |              |                        |           |                       |                 |           |   |
|   | 33s  | Fined elements in Nonlinear Mechanics                    |              |              |            |              |                        |           |                       |                 |           |   |
|   | 33t  | Renewable electricity production                         |              |              |            |              |                        |           |                       |                 |           |   |
|   | ---  | A module to choose from the list L5:                     | 15           | 7,5          |            | 22,5         | 2                      |           |                       | C               |           |   |
| 34r   | Material removal and industrial applications |  |              |              |            |              |                        |           |                       |                 |           |   |
| 34s   | Flexible workshop and industry 4.0           |  |              |              |            |              |                        |           |                       |                 |           |   |
| 34t   | Fatigue and failure of materials             |  |              |              |            |              |                        |           |                       |                 |           |   |
| CU04  | ---  | A module to choose from:                                 |              | 22,5         |            | 22,5         | 1                      | 5         | C                     |                 |           |   |
|   | 40r  | English 5  |              |              |            |              |                        |           |                       |                 |           |   |
|   | 40s  | German 2   |              |              |            |              |                        |           |                       |                 |           |   |
|   | 40t  | Chinese 2  |              |              |            |              |                        |           |                       |                 |           |   |
|   | 41c  | Business law   | 15           | 7,5          |            | 22,5         | 1                      |           | C                     |                 |           |   |
|   | 42c  | Project Preparation Week 3rd year                        |              | 22,5         |            | 22,5         | 1                      |           | C                     |                 |           |   |
|   | 43c  | Project Management                                       | 15           | 7,5          |            | 22,5         | 1                      |           |                       |                 | X         |   |
|   | 44c  | Professional integration and career development          | 15           | 7,5          |            | 22,5         | 1                      |           | C                     |                 |           |   |
| <b>Semester 2</b>   |  |  |              |              |            |              |                        |           |                       |                 |           |   |
| CU01  | 60c  | End of study project                                     |              |              | 450        | 450          | 30                     | 30        | X                     |                 |           |   |
| <b>Total</b>  |  |  | <b>240</b>   | <b>187,5</b> | <b>483</b> | <b>910,5</b> | <b>60</b>              | <b>60</b> | <b>12</b>             | <b>2</b>        | <b>10</b> |   |



| Computer Engineering - First Year - Semester 1<br>2023-2024 |      |   |              |            |             |              |                        |           |                       |                 |           |
|---|------|---|--------------|------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|-----------|
| Course Unit   | Code | Course Title                              | Course hours |            |             |              | Credits / Coefficients |           | Evaluation mode       |                 |           |
|   |      |   | Lectures     | Tutorials  | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01  | 10a  | Mathematics for the engineer I            | 30           | 15         |             | 45           | 3                      | 8         | C                     | X               | X         |
|   | 11a  | Numerical Matrix Analysis                 | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X         |
|   | 12a  | Probability                               | 15           | 7,5        |             | 22,5         | 1,5                    |           |                       |                 | X         |
|   | 13a  | Statistics                                | 15           | 7,5        |             | 22,5         | 1,5                    |           |                       |                 | X         |
| CU02  | 20a  | Formal logic and discrete mathematics     | 30           | 15         |             | 45           | 2,5                    | 7         |                       | X               | X         |
|   | 21a  | Logic Circuits                            | 30           | 15         |             | 45           | 2,5                    |           |                       | X               | X         |
|   | 22a  | Nanomaterials for computer scientists     | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X         |
| CU03  | 30a  | Algorithm Data Structures and Programming | 15           | 7,5        |             | 22,5         | 2                      | 10        |                       |                 | X         |
|   | 31a  | Procedural programming                    | 30           | 15         |             | 45           | 3                      |           | C                     |                 | X         |
|   | 32a  | Mini Project in Procedural Programming    |              | 7,5        | 15          | 22,5         | 2                      |           | C                     |                 |           |
|   | 33a  | Introduction to operating systems         | 15           | 7,5        | 22,5        | 45           | 3                      |           | C                     |                 | X         |
| CU04  | 40a  | English 1                                 |              | 22,5       |             | 22,5         | 1                      | 5         | C                     |                 |           |
|   | 41a  | French 1                                  | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |           |
|   | 42a  | Project Preparation Week 1st year         | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |           |
|   | 43a  | General economy                           | 30           | 15         |             | 45           | 2                      |           | C                     |                 | X         |
|   |      | <b>Total</b>                              | <b>270</b>   | <b>165</b> | <b>37,5</b> | <b>472,5</b> | <b>30</b>              | <b>30</b> | <b>8</b>              | <b>3</b>        | <b>11</b> |

| Computer Engineering - First Year - Semester 2<br>2023-2024 |      |  |              |              |           |            |                        |           |                       |                 |          |
|---|------|--|--------------|--------------|-----------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title                               | Course hours |              |           |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |  | Lectures     | Tutorials    | PW        | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 50a  | Structure of computers and microprocessors | 22,5         | 7,5          | 15        | 45         | 3                      | 9         | C                     |                 | X        |
|   | 51a  | Database Design                            | 30           | 15           |           | 45         | 3                      |           | C                     |                 | X        |
|   | 52a  | Basic concepts of networks                 | 30           | 15           |           | 45         | 3                      |           |                       | X               | X        |
| CU02  | 60a  | Language Theory and Automata               | 30           | 15           |           | 45         | 3                      | 8         |                       | X               | X        |
|   | 61a  | Object-oriented programming                | 30           | 15           |           | 45         | 3                      |           | C                     |                 | X        |
|   | 62a  | Mini-project object oriented programming   |              | 7,5          | 15        | 22,5       | 2                      |           | C                     |                 |          |
| CU03  | 70a  | System week                                | 15           | 7,5          |           | 22,5       | 1                      | 8         | C                     |                 |          |
|   | 71a  | Measurements and instrumentation           | 15           | 7,5          |           | 22,5       | 2                      |           |                       |                 | X        |
|   | 72a  | Physics and instrumentation Lab            |              |              | 22,5      | 22,5       | 1                      |           | C                     |                 |          |
|   | 73a  | Project of end of 1st year INFO            |              |              | 22,5      | 22,5       | 2                      |           | C                     |                 |          |
|   | 74a  | Signals and Systems                        | 15           | 7,5          |           | 22,5       | 2                      |           |                       |                 | X        |
| CU04  | 80a  | English 2                                  |              | 22,5         |           | 22,5       | 1                      | 5         | C                     |                 |          |
|   | 81a  | French 2                                   | 15           | 7,5          |           | 22,5       | 1                      |           | C                     |                 |          |
|   | 82a  | Entrepreneurship and innovation            | 15           | 7,5          |           | 22,5       | 2                      |           | C                     |                 |          |
|   | 83a  | Business Management                        | 15           | 7,5          |           | 22,5       | 1                      |           | C                     |                 |          |
|   |      | <b>Total</b>                               | <b>232,5</b> | <b>142,5</b> | <b>75</b> | <b>450</b> | <b>30</b>              | <b>30</b> | <b>11</b>             | <b>2</b>        | <b>7</b> |

| Computer Engineering - Second Year - Semester 1<br>2023-2024 |      |   |              |              |           |              |                        |           |                       |                 |          |
|--|------|---|--------------|--------------|-----------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit  | Code | Course Title                              | Course hours |              |           |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |      |   | Lectures     | Tutorials    | PW        | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 10b  | Object Oriented Analysis and Design       | 30           | 15           |           | 45           | 3                      | 9         | C                     |                 | X        |
|  | 11b  | Software engineering                      | 30           | 15           |           | 45           | 3                      |           | C                     |                 | X        |
|  | 12b  | Operational Research and Optimization     | 30           | 15           |           | 45           | 3                      |           |                       | X               | X        |
| CU02   | 20b  | Functional and logical programming        | 15           | 7,5          |           | 22,5         | 2                      | 8         |                       |                 | X        |
|  | 21b  | Operating System: Architectures and Tools | 22,5         | 15           | 7,5       | 45           | 3                      |           | C                     |                 | X        |
|  | 22b  | Web and Multimedia Development            | 30           | 15           |           | 45           | 3                      |           | C                     |                 | X        |
| CU03   | 30b  | Parallel calculation and synchronization  | 15           | 7,5          |           | 22,5         | 1,5                    | 9         |                       |                 | X        |
|  | 31b  | Algorithms and Complexity                 | 15           | 7,5          |           | 22,5         | 1,5                    |           |                       |                 | X        |
|  | 32b  | J2EE Technologies                         | 30           | 15           |           | 45           | 3                      |           | C                     |                 |          |
|  | 33b  | Protocols and Routing Concepts            | 22,5         | 15           | 7,5       | 45           | 3                      |           | C                     |                 | X        |
| CU04   | 40b  | English 3                                 |              | 22,5         |           | 22,5         | 1                      | 4         | C                     |                 |          |
|  | 41b  | French 3                                  | 15           | 7,5          |           | 22,5         | 1                      |           | C                     |                 |          |
|  | 42b  | Opening week                              | 15           | 7,5          |           | 22,5         | 1                      |           | C                     |                 |          |
|  | 43b  | Project Preparation Week 2nd year         |              | 22,5         |           | 22,5         | 1                      |           | C                     |                 |          |
|  |      | <b>Total</b>                              | <b>270</b>   | <b>187,5</b> | <b>15</b> | <b>472,5</b> | <b>30</b>              | <b>30</b> | <b>10</b>             | <b>1</b>        | <b>9</b> |

| Computer Engineering - Second Year - Semester 2<br>2023-2024 |   |  |              |            |              |            |                        |           |                       |                 |          |
|--|---|--|--------------|------------|--------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit  | Code                                    | Course Title                             | Course hours |            |              |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |   |  | Lectures     | Tutorials  | PW           | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 50b                                     | C # and .Net technologies                | 30           | 15         |              | 45         | 3                      | 8         | C                     |                 | X        |
|  | 51b                                     | Local corporate networks                 | 22,5         | 15         | 7,5          | 45         | 3                      |           | C                     |                 | X        |
|  | ---                                     | A module to choose from:                 | 15           | 7,5        |              | 22,5       | 2                      |           | C                     |                 |          |
|  | 52k                                     | Microprocessor design                    | 15           | 7,5        |              | 22,5       |                        |           |                       |                 |          |
|  | 52l                                     | Image processing                         | 15           | 7,5        |              | 22,5       |                        |           |                       |                 |          |
| CU02   | 52m                                     | Geospatial Information System            | 15           | 7,5        |              | 22,5       |                        |           |                       |                 |          |
|  | 60b                                     | Compilation                              | 15           | 7,5        |              | 22,5       | 2                      | 9         |                       |                 | X        |
|  | 61b                                     | SGBD                                     | 15           | 7,5        |              | 22,5       | 2                      |           |                       |                 | X        |
|  | 62b                                     | Artificial intelligence                  | 30           | 15         |              | 45         | 3                      |           |                       |                 | X        |
| 63b  | Mini Project in Artificial Intelligence |  | 7,5          | 15         | 22,5         | 2          | C                      |           |                       |                 |          |
| CU03   | 70b                                     | Introduction to Embedded Systems         | 15           | 7,5        |              | 22,5       | 2                      | 8         | C                     |                 |          |
|  | 71b                                     | Multi-Platform Mobile Developments       | 15           | 7,5        |              | 22,5       | 2                      |           | C                     |                 |          |
|  | 72b                                     | End of Year Project of the 2nd year INFO |              |            | 90           | 90         | 4                      |           | C                     |                 |          |
| CU04   | ---                                     | A module to choose from:                 |              | 22,5       |              | 22,5       | 1                      | 5         | C                     |                 |          |
|  | 80k                                     | English 4                                |              |            |              |            |                        |           |                       |                 |          |
|  | 80l                                     | German I                                 |              |            |              |            |                        |           |                       |                 |          |
|  | 80m                                     | Chinese 1                                |              |            |              |            |                        |           |                       |                 |          |
|  | 81b                                     | Workflow et BPMN                         | 15           | 7,5        |              | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 82b                                     | eBusiness                                | 15           | 7,5        |              | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 83b                                     | Communications and self-management       | 15           | 7,5        |              | 22,5       | 1                      | C         |                       |                 |          |
|  |   | <b>Total</b>                             | <b>202,5</b> | <b>135</b> | <b>112,5</b> | <b>450</b> | <b>30</b>              | <b>30</b> | <b>11</b>             | <b>0</b>        | <b>5</b> |

| Computer Engineering - Third Year - Semester 1<br>Option Mobile and Embedded Development<br>2023-2024 |      |   |              |              |            |              |                        |           |                       |                 |          |
|---|------|---|--------------|--------------|------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title  | Course hours |              |            |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |   | Lectures     | Tutorials    | PW         | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 10c  | Parallel Architectures and Virtualization                 | 15           | 7,5          |            | 22,5         | 1,5                    | 10        | C                     |                 |          |
|   | 11c  | Cloud Architectures and Services                          | 15           | 7,5          |            | 22,5         | 1,5                    |           |                       |                 | X        |
|   | 12c  | Internet of Things (IoT)                                  | 15           | 7,5          |            | 22,5         | 2                      |           | C                     |                 |          |
|   | 13c  | Distributed databases                                     | 15           | 7,5          |            | 22,5         | 2                      |           |                       |                 | X        |
|   | ---  | A module to choose from:                                  | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 14r  | Spatial Computing using Python                            |              |              |            |              |                        |           |                       |                 |          |
|   | 14s  | Web Service   |              |              |            |              |                        |           |                       |                 |          |
|   | 14t  | Semantic Web and Ontology                                 |              |              |            |              |                        |           |                       |                 |          |
|   | 14u  | Module to be precised                                     |              |              |            |              |                        |           |                       |                 |          |
| CU02  | 15c  | Service-Oriented Architectures (SOA)                      | 15           | 7,5          |            | 22,5         | 1,5                    | C         |                       |                 |          |
|   | 20c  | Security techniques and properties                        | 15           | 7,5          |            | 22,5         | 1,5                    | C         |                       |                 |          |
|   | 21c  | Formal verification of software                           | 15           | 7,5          |            | 22,5         | 1,5                    |           |                       | X               |          |
|   | 22c  | Wireless networks   | 15           | 7,5          |            | 22,5         | 1,5                    |           |                       | X               |          |
|   | 23c  | Network Services and Administration                       | 15           | 7,5          |            | 22,5         | 1,5                    | C         |                       |                 |          |
| CU03  | ---  | <b>Option Mobile and Embedded Development</b>             |              |              |            |              |                        | 9         |                       |                 |          |
|   | 30r  | Real time systems   | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 30s  | Modeling language, simulation and hardware test           | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 30t  | IOS development   | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 30u  | Android development                                       | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 30v  | Communication and Security of embedded and mobile systems | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 30w  | Development techniques for embedded systems               | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
| CU04  | ---  | A module to choose from:                                  |              | 22,5         |            | 22,5         | 1                      | 5         | C                     |                 |          |
|   | 40r  | English 5   |              |              |            |              |                        |           |                       |                 |          |
|   | 40s  | German 2  |              |              |            |              |                        |           |                       |                 |          |
|   | 40t  | Chinese 2   |              |              |            |              |                        |           |                       |                 |          |
|   | 41c  | Business law  | 15           | 7,5          |            | 22,5         | 1                      |           | C                     |                 |          |
|   | 42c  | Project Preparation Week 3rd year                         |              | 22,5         |            | 22,5         | 1                      |           | C                     |                 |          |
|   | 43c  | Professional integration and career development           | 15           | 7,5          |            | 22,5         | 1                      |           | C                     |                 |          |
|   | 44c  | Project Management  | 15           | 7,5          |            | 22,5         | 1                      |           |                       |                 | X        |
| <b>Semester 2</b>   |      |   |              |              |            |              |                        |           |                       |                 |          |
| CU01  | 60c  | End of study project                                      |              |              | 450        | 450          | 30                     | 30        | X                     |                 |          |
| <b>Total</b>  |      |   | <b>285</b>   | <b>187,5</b> | <b>450</b> | <b>922,5</b> | <b>60</b>              | <b>60</b> | <b>16</b>             | <b>0</b>        | <b>5</b> |

| Computer Engineering - Third Year - Semester 1<br>Option Software and Data Engineering<br>2023-2024 |      |  |              |              |            |              |                        |           |                       |                 |          |
|---|------|--|--------------|--------------|------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title   | Course hours |              |            |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |  | Lectures     | Tutorials    | PW         | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 10c  | Parallel Architectures and Virtualization                  | 15           | 7,5          |            | 22,5         | 1,5                    | 10        | C                     |                 |          |
|   | 11c  | Cloud Architectures and Services                           | 15           | 7,5          |            | 22,5         | 1,5                    |           |                       |                 | X        |
|   | 12c  | Internet of Things (IoT)                                   | 15           | 7,5          |            | 22,5         | 2                      |           | C                     |                 |          |
|   | 13c  | Distributed databases                                      | 15           | 7,5          |            | 22,5         | 2                      |           |                       |                 | X        |
|   | ---  | A module to choose from:                                   | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 14r  | Spatial Computing using Python                             |              |              |            |              |                        |           |                       |                 |          |
|   | 14s  | Web Service  |              |              |            |              |                        |           |                       |                 |          |
|   | 14t  | Semantic Web and Ontology                                  |              |              |            |              |                        |           |                       |                 |          |
|   | 14u  | Module to be precised                                      |              |              |            |              |                        |           |                       |                 |          |
| CU02  | 15c  | Service-Oriented Architectures (SOA)                       | 15           | 7,5          |            | 22,5         | 1,5                    | C         |                       |                 |          |
|   | 20c  | Security techniques and properties                         | 15           | 7,5          |            | 22,5         | 1,5                    | C         |                       |                 |          |
|   | 21c  | Formal verification of software                            | 15           | 7,5          |            | 22,5         | 1,5                    |           |                       | X               |          |
|   | 22c  | Wireless networks  | 15           | 7,5          |            | 22,5         | 1,5                    |           |                       | X               |          |
|   | 23c  | Network Services and Administration                        | 15           | 7,5          |            | 22,5         | 1,5                    | C         |                       |                 |          |
| CU03  | ---  | <b>Option Software and Data Engineering</b>                |              |              |            |              |                        | 9         |                       |                 |          |
|   | 31r  | Software Architecture                                      | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 31s  | Software Testing and Quality (ISTQB Certification)         | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 31t  | Integrated systems of institutions and information systems | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 31u  | Big Data   | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 31v  | Data mining INFO   | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
|   | 31w  | Machine learning INFO                                      | 15           | 7,5          |            | 22,5         | 1,5                    |           | C                     |                 |          |
| CU04  | ---  | A module to choose from:                                   |              | 22,5         |            | 22,5         | 1                      | 5         | C                     |                 |          |
|   | 40r  | English 5  |              |              |            |              |                        |           |                       |                 |          |
|   | 40s  | German 2   |              |              |            |              |                        |           |                       |                 |          |
|   | 40t  | Chinese 2  |              |              |            |              |                        |           |                       |                 |          |
|   | 41c  | Business law   | 15           | 7,5          |            | 22,5         | 1                      |           | C                     |                 |          |
|   | 42c  | Project Preparation Week 3rd year                          |              | 22,5         |            | 22,5         | 1                      |           | C                     |                 |          |
|   | 43c  | Professional integration and career development            | 15           | 7,5          |            | 22,5         | 1                      |           | C                     |                 |          |
|   | 44c  | Project Management   | 15           | 7,5          |            | 22,5         | 1                      |           |                       |                 | X        |
| <b>Semester 2</b>   |      |  |              |              |            |              |                        |           |                       |                 |          |
| CU01  | 60c  | End of study project                                       |              |              | 450        | 450          | 30                     | 30        | X                     |                 |          |
|   |      | <b>Total</b>   | <b>285</b>   | <b>187,5</b> | <b>450</b> | <b>922,5</b> | <b>60</b>              | <b>60</b> | <b>16</b>             | <b>0</b>        | <b>5</b> |

| Telecommunications Engineering - First Year - Semester 1<br>2023-2024 |      |  |              |              |             |            |                        |           |                       |                 |           |
|---|------|--|--------------|--------------|-------------|------------|------------------------|-----------|-----------------------|-----------------|-----------|
| Course Unit   | Code | Course Title                               | Course hours |              |             |            | Credits / Coefficients |           | Evaluation mode       |                 |           |
|   |      |  | Lectures     | Tutorials    | PW          | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01  | 10a  | Mathematics for the engineer I             | 30           | 15           |             | 45         | 3                      | 8         | C                     | X               | X         |
|   | 11a  | Numerical Matrix Analysis                  | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X         |
|   | 12a  | Signals and Systems                        | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X         |
|   | 13a  | Project Preparation Week 1st year          | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |           |
| CU02  | 20a  | Probability                                | 15           | 7,5          |             | 22,5       | 1,5                    | 8         |                       |                 | X         |
|   | 21a  | Statistics                                 | 15           | 7,5          |             | 22,5       | 1,5                    |           |                       |                 | X         |
|   | 22a  | Emerging technologies in radio frequencies | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X         |
|   | 23a  | Measurements and instrumentation           | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X         |
|   | 24a  | Physics and instrumentation Lab            |              |              | 22,5        | 22,5       | 1                      |           | C                     |                 |           |
| CU03  | 30a  | Procedural programming                     | 30           | 15           |             | 45         | 3                      | 10        | C                     |                 | X         |
|   | 31a  | Mini Project in Procedural Programming     |              | 7,5          | 15          | 22,5       | 2                      |           | C                     |                 |           |
|   | 32a  | Digital Electronics 1                      | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X         |
|   | 33a  | Communication electronics                  | 30           | 15           |             | 45         | 3                      |           |                       | X               | X         |
| CU04  | 40a  | English 1                                  |              | 22,5         |             | 22,5       | 1                      | 4         | C                     |                 |           |
|   | 41a  | French 1                                   | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |           |
|   | 42a  | General economy                            | 30           | 15           |             | 45         | 2                      |           | C                     |                 | X         |
|   |      | <b>Total</b>                               | <b>255</b>   | <b>157,5</b> | <b>37,5</b> | <b>450</b> | <b>30</b>              | <b>30</b> | <b>8</b>              | <b>2</b>        | <b>11</b> |

| Telecommunications Engineering - First Year - Semester 2<br>2023-2024 |      |  |              |            |             |              |                        |           |                       |                 |          |
|---|------|--|--------------|------------|-------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit   | Code | Course Title                             | Course hours |            |             |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|   |      |  | Lectures     | Tutorials  | PW          | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01  | 50a  | Basic concepts of networks               | 30           | 15         |             | 45           | 3                      | 8         |                       | X               | X        |
|   | 51a  | Operational Research and Optimization    | 30           | 15         |             | 45           | 3                      |           |                       | X               | X        |
|   | 52a  | Computer and microprocessor architecture | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
| CU02  | 60a  | Object-oriented programming              | 30           | 15         |             | 45           | 3                      | 9         | C                     |                 | X        |
|   | 61a  | Mini-project object oriented programming |              | 7,5        | 15          | 22,5         | 2                      |           | C                     |                 |          |
|   | 62a  | System week                              | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|   | ---  | A module to choose from:                 | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|   | 63d  | JAVA programming                         |              |            |             |              |                        |           |                       |                 |          |
|   | 63e  | C # programming                          |              |            |             |              |                        |           |                       |                 |          |
|   | 64a  | Year-end project TEL                     |              |            | 22,5        | 22,5         | 2                      |           | C                     |                 |          |
| CU03  | 70a  | Theory of information and coding         | 15           | 7,5        |             | 22,5         | 2                      | 8         |                       |                 | X        |
|   | 71a  | Digital signal processing                | 15           | 7,5        | 15          | 37,5         | 2                      |           | C                     |                 | X        |
|   | 72a  | Telecommunications infrastructure        | 15           | 7,5        |             | 22,5         | 2                      |           |                       |                 | X        |
|   | 73a  | Guided propagation and radiation         | 15           | 7,5        | 15          | 37,5         | 2                      |           | C                     |                 | X        |
| CU04  | 80a  | English 2                                |              | 22,5       |             | 22,5         | 1                      | 5         | C                     |                 |          |
|   | 81a  | French 2                                 | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|   | 82a  | Entrepreneurship and innovation          | 15           | 7,5        |             | 22,5         | 2                      |           | C                     |                 |          |
|   | 83a  | Business Management                      | 15           | 7,5        |             | 22,5         | 1                      |           | C                     |                 |          |
|   |      | <b>Total</b>                             | <b>240</b>   | <b>150</b> | <b>67,5</b> | <b>457,5</b> | <b>30</b>              | <b>30</b> | <b>11</b>             | <b>2</b>        | <b>8</b> |



| Telecommunications Engineering - Second Year - Semester 1<br>2023-2024 |      |                                       |              |              |             |            |                        |           |                       |                 |          |
|--|------|---------------------------------------|--------------|--------------|-------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit  | Code | Course Title                          | Course hours |              |             |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |      |                                       | Lectures     | Tutorials    | PW          | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 10b  | Protocols and Routing Concepts        | 22,5         | 15           | 7,5         | 45         | 3                      | 9         | C                     |                 | X        |
|  | 11b  | Operating systems                     | 15           | 7,5          |             | 22,5       | 2                      |           | C                     |                 |          |
|  | 12b  | HF circuit calculation                | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X        |
|  | 13b  | Software Engineering 1                | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X        |
| CU02   | 20b  | Digital signal processing and Lab     | 15           | 7,5          | 22,5        | 45         | 3                      | 9         | C                     |                 | X        |
|  | 21b  | Data base                             | 30           | 15           |             | 45         | 3                      |           | C                     |                 | X        |
|  | 22b  | Signal transmission                   | 30           | 15           |             | 45         | 3                      |           |                       | X               | X        |
| CU03   | 30b  | Embedded processors and programming   | 22,5         | 15           | 7,5         | 45         | 3                      | 8         | C                     |                 | X        |
|  | 31b  | Object Oriented Analysis and Design 1 | 15           | 7,5          |             | 22,5       | 2                      |           |                       |                 | X        |
|  | ---  | A module to choose from:              | 15           | 7,5          |             | 22,5       | 2                      |           | C                     |                 |          |
|  | 32k  | .NET programming                      |              |              |             |            |                        |           |                       |                 |          |
|  | 32l  | JEE programming                       |              |              |             |            |                        |           |                       |                 |          |
|  | 33b  | Mini project JEE or .NET              |              | 7,5          | 15          | 22,5       | 1                      |           | C                     |                 |          |
| CU04   | 40b  | English 3                             |              | 22,5         |             | 22,5       | 1                      | 4         | C                     |                 |          |
|  | 41b  | French 3                              | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |          |
|  | 42b  | Project Preparation Week 2nd year     |              | 22,5         |             | 22,5       | 1                      |           | C                     |                 |          |
|  | 43b  | Opening week                          | 15           | 7,5          |             | 22,5       | 1                      |           | C                     |                 |          |
|  |      | <b>Total</b>                          | <b>225</b>   | <b>172,5</b> | <b>52,5</b> | <b>450</b> | <b>30</b>              | <b>30</b> | <b>11</b>             | <b>1</b>        | <b>8</b> |

| Telecommunications Engineering - Second Year - Semester 2<br>2023-2024 |                                   |  |              |            |            |              |                        |           |                       |                 |          |
|--|-----------------------------------|--|--------------|------------|------------|--------------|------------------------|-----------|-----------------------|-----------------|----------|
| Course Unit  | Code                              | Course Title                               | Course hours |            |            |              | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |                                   |  | Lectures     | Tutorials  | PW         | Total        | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 50b                               | Administration and system programming      | 15           | 7,5        | 22,5       | 45           | 3                      | 9         | C                     |                 |          |
|  | 51b                               | Networks of queues                         | 15           | 7,5        |            | 22,5         | 2                      |           |                       |                 | X        |
|  | 52b                               | Antennas                                   | 15           | 7,5        | 10,5       | 33           | 2                      |           | C                     |                 | X        |
|  | 53b                               | Project databases / software engineering   |              | 22,5       |            | 22,5         | 2                      |           | C                     |                 |          |
| CU02   | 60b                               | Digital Communications                     | 15           | 7,5        | 22,5       | 45           | 3                      | 9         | C                     |                 | X        |
|  | 61b                               | Optical telecommunications systems         | 15           | 7,5        | 12         | 34,5         | 2                      |           | C                     |                 | X        |
|  | 62b                               | End of Year Project of the 2nd year TEL    |              |            | 90         | 90           | 4                      |           | C                     |                 |          |
| CU03   | 70b                               | 1D-2D data compression                     | 15           | 7,5        |            | 22,5         | 1                      | 8         |                       |                 | X        |
|  | 71b                               | Cellular mobile networks                   | 15           | 7,5        |            | 22,5         | 2                      |           |                       |                 | X        |
|  | 72b                               | Coding and protection of information       | 15           | 7,5        |            | 22,5         | 2                      |           |                       |                 | X        |
|  | 73b                               | Local corporate networks                   | 22,5         | 15         | 7,5        | 45           | 3                      |           | C                     |                 | X        |
| CU04   | ---                               | A module to choose from:                   |              | 22,5       |            | 22,5         | 1                      | 4         | C                     |                 |          |
|  | 80k                               | English 4                                  |              |            |            |              |                        |           |                       |                 |          |
|  | 80l                               | German I                                   |              |            |            |              |                        |           |                       |                 |          |
|  | 80m                               | Chinese 1                                  |              |            |            |              |                        |           |                       |                 |          |
|  | 81b                               | Communications and self-management         | 15           | 7,5        |            | 22,5         | 1                      |           | C                     |                 |          |
|  | ---                               | A module to choose from:                   | 15           | 7,5        |            | 22,5         | 2                      |           | C                     |                 |          |
|  | 82k                               | Embedded Linux                             |              |            |            |              |                        |           |                       |                 |          |
|  | 82l                               | Real time and embedded systems             |              |            |            |              |                        |           |                       |                 |          |
|  | 82m                               | Transmission by radio links and satellites |              |            |            |              |                        |           |                       |                 |          |
| 82n  | Modeling of transmission channels |  |              |            |            |              |                        |           |                       |                 |          |
| <b>Total</b>   |                                   |  | <b>172,5</b> | <b>135</b> | <b>165</b> | <b>472,5</b> | <b>30</b>              | <b>30</b> | <b>10</b>             | <b>0</b>        | <b>8</b> |

| Telecommunications Engineering - Third Year - Semester 1 |   |   |              |            |            |            |                        |           |                       |                 |          |
|--|---|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Option Internet of Things (IoT)                          |   |   |              |            |            |            |                        |           |                       |                 |          |
| 2023-2024  |   |   |              |            |            |            |                        |           |                       |                 |          |
| Course Unit  | Code  | Course Title  | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |   |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 10c   | Design of learning algorithms for AI                                | 15           | 7,5        |            | 22,5       | 2                      | 10        | C                     |                 |          |
|  | 11c   | RF systems  | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |          |
|  | 12c   | Technologies for optical networks                                   | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|  | 13c   | Advanced cellular mobile radio networks (4G, LTE, LTE advanced, 5G) | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|  | ---   | A module to choose from:  | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 |          |
|  | 14r   | Big Data  |              |            |            |            |                        |           | C                     |                 |          |
|  | 14s   | Mobile development  |              |            |            |            |                        |           | C                     |                 |          |
|  | 14t   | Service Oriented Architectures                                      |              |            |            |            |                        |           | C                     |                 |          |
|  | 14u   | Cooperative Communications  |              |            |            |            |                        |           | C                     |                 |          |
|  | 14v   | Data mining TEL   |              |            |            |            |                        |           |                       |                 | X        |
|  | 14w   | Optimization of antenna networks MEMO                               |              |            |            |            |                        |           | C                     |                 |          |
|  | 14x   | Spatial Computing using Python                                      |              |            |            |            |                        |           | C                     |                 |          |
| 14y  | Semantic Web and Ontology                       |   |              |            |            |            | C                      |           |                       |                 |          |
| 14z  | Module to be precised                           |   |              |            |            |            | C                      |           |                       |                 |          |
| CU02   | ---   | <b>Option Internet of Things (IoT)</b>                              |              |            |            |            |                        | 7         |                       |                 |          |
|  | 20r   | Artificial Intelligence for IOT: Engineering Design Project         | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 20s   | Software Defined Networks   | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X        |
|  | 20t   | Blockchain  | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 20u   | Building Internet of Things   | 30           | 15         |            | 45         | 2,5                    |           | C                     |                 | X        |
| CU03   | ---   | <b>Option Internet of Things (IoT)</b>                              |              |            |            |            |                        | 6         |                       |                 |          |
|  | 30r   | Artificial intelligence TEL   | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X        |
|  | 30s   | RFID and applications   | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 30t   | Machine learning operations   | 30           | 15         |            | 45         | 3                      |           |                       | X               | X        |
| CU04   | ---   | A module to choose from:  |              |            |            | 22,5       | 1                      | 7         | C                     |                 |          |
|  | 40r   | English 5   |              |            |            |            |                        |           |                       |                 |          |
|  | 40s   | German 2  |              |            |            |            |                        |           |                       |                 |          |
|  | 40t   | Chinese 2   |              |            |            |            |                        |           |                       |                 |          |
|  | 41c   | Basic Concepts of Security  | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|  | 42c   | Business law  | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |          |
|  | 43c   | Project Preparation Week 3rd year                                   |              | 7,5        | 15         | 22,5       | 1                      |           | C                     |                 |          |
|  | 44c   | Project Management  | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 | X        |
| 45c  | Professional integration and career development | 15  | 7,5          |            | 22,5       | 1          | C                      |           |                       |                 |          |
| Semester 2   |   |   |              |            |            |            |                        |           |                       |                 |          |
| CU01   | 60c   | End of study project  |              |            | 450        | 450        | 30                     | 30        | X                     |                 |          |
| <b>Total</b>   |   |   | <b>270</b>   | <b>165</b> | <b>465</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>18</b>             | <b>1</b>        | <b>9</b> |

| Telecommunications Engineering - Third Year - Semester 1 |   |   |              |            |            |            |                        |           |                       |                 |          |
|--|---|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|----------|
| Option Data Science for Embedded Communication (DASEC)   |   |   |              |            |            |            |                        |           |                       |                 |          |
| 2023-2024  |   |   |              |            |            |            |                        |           |                       |                 |          |
| Course Unit  | Code  | Course Title  | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |          |
|  |   |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam     |
| CU01   | 10c   | Design of learning algorithms for AI                                | 15           | 7,5        |            | 22,5       | 2                      | 10        | C                     |                 |          |
|  | 11c   | RF systems  | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |          |
|  | 12c   | Technologies for optical networks                                   | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|  | 13c   | Advanced cellular mobile radio networks (4G, LTE, LTE advanced, 5G) | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|  | ---   | A module to choose from:  | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 |          |
|  | 14r   | Big Data  |              |            |            |            |                        |           | C                     |                 |          |
|  | 14s   | Mobile development  |              |            |            |            |                        |           | C                     |                 |          |
|  | 14t   | Service Oriented Architectures                                      |              |            |            |            |                        |           | C                     |                 |          |
|  | 14u   | Cooperative Communications  |              |            |            |            |                        |           | C                     |                 |          |
|  | 14v   | Data mining TEL   |              |            |            |            |                        |           |                       |                 | X        |
|  | 14w   | Optimization of antenna networks MEMO                               |              |            |            |            |                        |           | C                     |                 |          |
|  | 14x   | Spatial Computing using Python                                      |              |            |            |            |                        |           | C                     |                 |          |
| 14y  | Semantic Web and Ontology                       |   |              |            |            |            | C                      |           |                       |                 |          |
| 14z  | Module to be precised                           |   |              |            |            |            | C                      |           |                       |                 |          |
| CU02   | ---   | <b>Option Data Science for Embedded Communication (DASEC)</b>       |              |            |            |            |                        | 7         |                       |                 |          |
|  | 21r   | Engineering Design Project I  | 6            | 39         |            | 45         | 2,5                    |           | C                     |                 |          |
|  | 21s   | Machine learning TEL  | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 21t   | Deep learning TEL   | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 21u   | Edge, Fog and Cloud Computing for Data Science                      | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
| CU03   | ---   | <b>Option Data Science for Embedded Communications (DASEC)</b>      |              |            |            |            |                        | 6         |                       |                 |          |
|  | 31r   | Signal Processing for Data Science                                  | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 31s   | Computer vision   | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 31t   | 5G solutions for Embedded Communications                            | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |          |
|  | 31u   | Implementation of machine learning                                  | 3            | 19,5       |            | 22,5       | 1,5                    |           | C                     |                 |          |
| CU04   | ---   | A module to choose from:  |              | 22,5       |            | 22,5       | 1                      | 7         | C                     |                 |          |
|  | 40r   | English 5   |              |            |            |            |                        |           |                       |                 |          |
|  | 40s   | German 2  |              |            |            |            |                        |           |                       |                 |          |
|  | 40t   | Chinese 2   |              |            |            |            |                        |           |                       |                 |          |
|  | 41c   | Basic Concepts of Security  | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X        |
|  | 42c   | Business law  | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |          |
|  | 43c   | Project Preparation Week 3rd year                                   |              | 7,5        | 15         | 22,5       | 1                      |           | C                     |                 |          |
|  | 44c   | Project Management  | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 | X        |
| 45c  | Professional integration and career development | 15  | 7,5          |            | 22,5       | 1          | C                      |           |                       |                 |          |
| Semester 2   |   |   |              |            |            |            |                        |           |                       |                 |          |
| CU01   | 60c   | End of study project  |              |            | 450        | 450        | 30                     | 30        | X                     |                 |          |
|  |   | <b>Total</b>  | <b>270</b>   | <b>165</b> | <b>465</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>22</b>             | <b>0</b>        | <b>5</b> |

| Telecommunications Engineering - Third Year - Semester 1<br>Option Converged Infrastructures and Cloud Computing (I3C)<br>2023-2024 |   |   |              |            |            |            |                        |           |                       |                 |           |
|---|---|---|--------------|------------|------------|------------|------------------------|-----------|-----------------------|-----------------|-----------|
| Course Unit   | Code  | Course Title  | Course hours |            |            |            | Credits / Coefficients |           | Evaluation mode       |                 |           |
|   |   |   | Lectures     | Tutorials  | PW         | Total      | Module                 | CU        | Continuous assessment | Supervised Test | Exam      |
| CU01  | 10c   | Design of learning algorithms for AI                                | 15           | 7,5        |            | 22,5       | 2                      | 10        | C                     |                 |           |
|   | 11c   | RF systems  | 15           | 7,5        |            | 22,5       | 2                      |           | C                     |                 |           |
|   | 12c   | Technologies for optical networks                                   | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X         |
|   | 13c   | Advanced cellular mobile radio networks (4G, LTE, LTE advanced, 5G) | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X         |
|   | ---   | A module to choose from:  | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 |           |
|   | 14r   | Big Data  |              |            |            |            |                        |           | C                     |                 |           |
|   | 14s   | Mobile development  |              |            |            |            |                        |           | C                     |                 |           |
|   | 14t   | Service Oriented Architectures                                      |              |            |            |            |                        |           | C                     |                 |           |
|   | 14u   | Cooperative Communications  |              |            |            |            |                        |           | C                     |                 |           |
|   | 14v   | Data mining TEL   |              |            |            |            |                        |           |                       |                 | X         |
|   | 14w   | Optimization of antenna networks MEMO                               |              |            |            |            |                        |           | C                     |                 |           |
|   | 14x   | Spatial Computing using Python                                      |              |            |            |            |                        |           | C                     |                 |           |
| 14y   | Semantic Web and Ontology                       |   |              |            |            |            | C                      |           |                       |                 |           |
| 14z   | Module to be precised                           |   |              |            |            |            | C                      |           |                       |                 |           |
| CU02  | ---   | <b>Option Converged Infrastructures and Cloud Computing (I3C)</b>   |              |            |            |            |                        | 7         |                       |                 |           |
|   | 22r   | Network management, services and cloud monitoring                   | 30           | 15         |            | 45         | 2,5                    |           | C                     |                 | X         |
|   | 22s   | QoS in IP / MPLS networks   | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
|   | 22t   | Virtualization and high availability                                | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
|   | 22u   | Network and cloud security  | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
| CU03  | ---   | <b>Option Converged Infrastructures and Cloud Computing (I3C)</b>   |              |            |            |            |                        | 6         |                       |                 |           |
|   | 32r   | Advanced Services Architectures                                     | 30           | 15         |            | 45         | 3                      |           | C                     |                 | X         |
|   | 32s   | Self-organizing wireless networks                                   | 15           | 7,5        |            | 22,5       | 1,5                    |           | C                     |                 |           |
|   | 32t   | Architecture and broadband networks                                 | 15           | 7,5        |            | 22,5       | 1,5                    |           |                       |                 | X         |
| CU04  | ---   | A module to choose from:  |              |            |            | 22,5       | 1                      | 7         | C                     |                 |           |
|   | 40r   | English 5   |              |            |            |            |                        |           |                       |                 |           |
|   | 40s   | German 2  |              |            |            |            |                        |           |                       |                 |           |
|   | 40t   | Chinese 2   |              |            |            |            |                        |           |                       |                 |           |
|   | 41c   | Basic Concepts of Security  | 15           | 7,5        |            | 22,5       | 2                      |           |                       |                 | X         |
|   | 42c   | Business law  | 15           | 7,5        |            | 22,5       | 1                      |           | C                     |                 |           |
|   | 43c   | Project Preparation Week 3rd year                                   |              | 7,5        | 15         | 22,5       | 1                      |           | C                     |                 |           |
|   | 44c   | Project Management  | 15           | 7,5        |            | 22,5       | 1                      |           |                       |                 | X         |
| 45c   | Professional integration and career development | 15  | 7,5          |            | 22,5       | 1          | C                      |           |                       |                 |           |
| <b>Semester 2</b>   |   |   |              |            |            |            |                        |           |                       |                 |           |
| CU01  | 60c   | End of study project  |              |            | 450        | 450        | 30                     | 30        | X                     |                 |           |
| <b>Total</b>  |   |   | <b>270</b>   | <b>165</b> | <b>465</b> | <b>900</b> | <b>60</b>              | <b>60</b> | <b>17</b>             | <b>0</b>        | <b>11</b> |