| Metropolia UAS<br>Information Tech<br>COMMON STUDII |   | extent of credits | Mathematics and natural sciences skills | Hardware skills | Network engineering skills | Software skills | ICT business skills | ICT application skills | Communication skills | Learning competence | Ethical competence | Working community competence | Innovation competence | Multicultural competence | Technological competence |
|---|---|-------------------|---|-----------------|----------------------------|-----------------|---------------------|------------------------|----------------------|---------------------|--------------------|------------------------------|-----------------------|--------------------------|--------------------------|
| 1st year of study                                   | Software 1                                    | 15                | x                                       | _               | _                          | Х               | _                   | ×                      | х                    | ×                   |                    | Х                            | _                     | ×                        | Х                        |
|   | Software 2                                    | 15                | Х                                       |                 |                            | Х               |                     | Х                      | Х                    | Х                   |                    | Х                            |                       | Х                        | Х                        |
|   | Hardware 1                                    | 15                | Х                                       | Х               | Х                          |                 |                     |                        | Х                    | Х                   |                    | Х                            |                       | Х                        | Х                        |
|   | Hardware 2                                    | 15                | Х                                       | Х               | Х                          |                 |                     |                        | Х                    | Х                   |                    | Х                            |                       | Х                        | Х                        |
|   | Finnish 1                                     | 5                 |   |                 |                            |                 |                     |                        | Х                    | Х                   | Х                  |                              |                       | Х                        |                          |
|   | Finnish 2                                     | 5                 |   |                 |                            |                 |                     |                        | Х                    | Х                   | Х                  |                              |                       | Х                        |                          |
| 3rd year of study                                   | Engineering Swedish                           | 5<br>5            |   |                 |                            |                 |                     |                        | Х                    |                     |                    | Х                            |                       | Х                        |                          |
|   | Engineering Finnish and Communication Skills  | 5                 |   |                 |                            |                 |                     |                        | Х                    |                     |                    | Х                            |                       | Х                        |                          |
|   | Finnish as a Second Language: Finnish at Work | 5                 |   |                 |                            |                 |                     |                        | Х                    |                     |                    | Х                            |                       | Х                        |                          |
|   | Economics                                     | 5                 |   |                 |                            |                 | Х                   |                        |                      |                     | Х                  |                              |                       |                          |                          |
| 4th year of study                                   | Multidisciplinary Innovation Project          | 10                | Х                                       | Х               | Х                          | Х               | Х                   | Х                      | Х                    | Х                   | Х                  | Х                            | Х                     | Х                        | Х                        |
|   | Academic and Research Communication           | 5                 |   |                 |                            |                 |                     | Х                      | Х                    |                     |                    | Х                            | Х                     |                          |                          |
|   | Work Placement 1                              | 15                | Х                                       | Х               | Х                          | Х               | Х                   | Х                      | Х                    | Х                   | Х                  | Х                            | Х                     | Х                        | Х                        |
|   | Work Placement 2                              | 15                | Х                                       | Х               | Х                          | Х               | Х                   | Х                      | Х                    | Х                   | Х                  | Х                            | Х                     | Х                        | Х                        |
|   | Bachelor's Thesis                             | 15                | Χ                                       | Х               | Х                          | Χ               | Х                   | Х                      | Χ                    | Х                   | Х                  | Х                            | Х                     | Х                        | Х                        |

| Metropolia UAS<br>Information Tech<br>MAJOR: SOFTWA | nology<br>IRE ENGINEERING                         | extent of credits | Mathematics and natural sciences skills | Hardware skills | Network engineering skills | Software skills | ICT business skills | ICT application skills | Communication skills | Learning competence | Ethical competence | Working community competence | nnovation competence | Multicultural competence | Technological competence |
|---|---|-------------------|---|-----------------|----------------------------|-----------------|---------------------|------------------------|----------------------|---------------------|--------------------|------------------------------|----------------------|--------------------------|--------------------------|
| 2nd year of study                                   | Object-oriented Programming                       | 10                |   |                 |                            | Х               |                     |                        |                      | X                   |                    |                              |                      |                          | х                        |
|   | Programming Project                               | 5                 |   |                 |                            | Х               |                     | Х                      | Х                    | Х                   |                    | Х                            |                      |                          | Х                        |
|   | Web Development                                   | 10                |   |                 | Х                          | Х               |                     |                        |                      | Х                   |                    |                              |                      |                          | Х                        |
|   | Web Project                                       | 5                 |   |                 | х                          | Х               |                     | Х                      | Х                    | Х                   |                    | Х                            |                      |                          | Х                        |
|   | Description and Modelling Techniques              | 5                 |   |                 |                            | Х               |                     |                        |                      | Х                   |                    |                              |                      |                          |                          |
|   | User-centered Design                              | 5                 |   |                 |                            | Х               |                     |                        |                      | Х                   |                    |                              |                      |                          |                          |
|   | Software Engineering Project 1                    | 5                 |   |                 | Х                          | Х               |                     | Х                      | Х                    | Х                   |                    | Х                            | Х                    |                          | Х                        |
|   | Data Structures and Algorithms                    | 5                 | Х                                       |                 |                            | Х               |                     |                        |                      | Х                   |                    |                              |                      |                          |                          |
|   | Design Patterns                                   | 5                 |   |                 |                            | Х               |                     |                        |                      | Х                   |                    |                              |                      |                          |                          |
|   | Software Engineering Project 2                    | 5                 |   |                 | Х                          | Х               |                     | Х                      | Х                    | Х                   |                    | Х                            | Х                    |                          | Х                        |
| 3rd year of study                                   | Probability Calculus and Statistics               | 5                 | Х                                       |                 |                            | Х               |                     |                        |                      | Х                   |                    |                              |                      |                          |                          |
|   | Design Patterns in Mobile Application Development | 5                 |   |                 |                            | Х               |                     | Х                      |                      | Х                   |                    |                              |                      |                          |                          |
|   | Sensors in Mobile Application Development         | 5                 |   | Х               |                            | Х               |                     | Х                      |                      | Х                   |                    |                              |                      |                          | Х                        |
|   | Advanced Mobile Application Development           | 5                 |   | Х               |                            | Х               |                     | Х                      |                      | Х                   |                    |                              |                      |                          | Х                        |
|   | Mobile Application Development Project            | 5                 |   | Х               | Х                          | Х               |                     | Х                      | Х                    | Х                   |                    | Х                            | Х                    |                          | Х                        |
|   | Ethical Hacking                                   | 5                 |   |                 |                            | Х               |                     | Х                      |                      | Х                   | Х                  |                              |                      |                          | Х                        |
|   | Special Professional Course                       | 5                 |   |                 |                            | Х               |                     | Х                      |                      | Х                   |                    |                              |                      |                          |                          |

| Metropolia UAS<br>Information Tech<br>MAJOR: GAME D |  | extent of credits | Mathematics and natural sciences skills | Hardware skills | Network engineering skills | Software skills | ICT business skills | ICT application skills | Communication skills | Learning competence | Ethical competence | Working community competence | Innovation competence | Multicultural competence | Technological competence |
|---|--|-------------------|---|-----------------|----------------------------|-----------------|---------------------|------------------------|----------------------|---------------------|--------------------|------------------------------|-----------------------|--------------------------|--------------------------|
| 2nd year of study                                   | Game Design                            | 5                 | _                                       | Х               | _                          | Х               | X                   | _                      | Х                    | X                   |                    | Х                            | x                     | _                        | Х                        |
|   | Game Engines                           | 5                 | Х                                       |                 | Х                          | х               |                     |                        |                      | Х                   |                    |                              |                       |                          | Х                        |
|   | Game Mathematics                       | 5                 | Х                                       |                 |                            | х               |                     |                        |                      | Х                   |                    |                              |                       |                          |                          |
|   | C++ Programming                        | 5                 | Х                                       |                 |                            | х               |                     |                        |                      | Х                   |                    |                              |                       |                          |                          |
|   | Basics of Game Graphics                | 5                 | Х                                       |                 |                            | х               |                     |                        |                      | Х                   |                    |                              | х                     |                          | х                        |
|   | Portfolio Project 1                    | 5                 |   |                 |                            | Х               | Х                   | Х                      | Х                    | Х                   |                    | Х                            | Х                     |                          | Х                        |
|   | Game Physics                           | 5                 | Х                                       |                 |                            | Х               |                     |                        |                      | Х                   |                    |                              |                       |                          |                          |
|   | Data Structures and Algorithms         | 5                 | Х                                       |                 |                            | Х               |                     | Х                      |                      | Х                   |                    |                              |                       |                          | Х                        |
|   | Data Structures and Algorithms Project | 5                 | Х                                       |                 |                            | Х               |                     | Х                      |                      | Х                   |                    | Х                            |                       |                          |                          |
|   | Portfolio Project 2                    | 15                |   |                 |                            | Х               | Х                   | Х                      | Х                    | Х                   |                    | Х                            | Х                     |                          | Х                        |
| 3rd year of study                                   | Advanced C++ Programming               | 5                 | Х                                       |                 |                            | Х               |                     | Х                      |                      | Х                   |                    |                              |                       |                          | Х                        |
|   | Game Server Programming                | 5                 |   | Х               | Х                          | Х               |                     | Х                      |                      | Х                   |                    |                              |                       |                          | Х                        |
|   | Graphics Programming                   | 5                 | Х                                       |                 |                            | Х               |                     |                        |                      | Х                   |                    |                              | Х                     |                          | Х                        |
|   | Multiplayer Game Project               | 15                |   |                 |                            | Х               | Х                   | Х                      | Х                    | Х                   |                    | Х                            | Х                     |                          | Х                        |
|   | Game Publishing and Analytics          | 5                 |   |                 |                            | Х               | Χ                   |                        | Х                    | Х                   | Х                  | Х                            | Х                     |                          | Х                        |

| Metropolia UAS<br>Information Techn<br>MAJOR: SMART IO |   | extent of credits | Mathematics and natural sciences skills | Hardware skills | Network engineering skills | Software skills | ICT business skills | ICT application skills | Communication skills | Learning competence | Ethical competence | Working community competence | Innovation competence | Multicultural competence | Technological competence |
|--|---|-------------------|---|-----------------|----------------------------|-----------------|---------------------|------------------------|----------------------|---------------------|--------------------|------------------------------|-----------------------|--------------------------|--------------------------|
| 2nd year of study                                      | C Programming in IoT Devices  | 5                 | _                                       | Х               | _                          | Х               | _                   | _                      |                      | x                   | _                  |                              | _                     |                          | Х                        |
|  | Switched Networks and Routing   | 5                 |   |                 | Х                          |                 |                     |                        |                      | Х                   |                    |                              |                       |                          | Х                        |
|  | Engineering Mathematics   | 5                 | Х                                       |                 |                            |                 |                     |                        |                      | Х                   |                    |                              |                       |                          |                          |
|  | Embedded Systems Programming  | 5                 |   | Х               | Х                          | Х               |                     | Х                      | Х                    | Х                   |                    |                              | Х                     |                          | Х                        |
|  | Linux Servers and Databases   | 5                 |   |                 | Х                          | Х               |                     | Х                      |                      | Х                   |                    |                              |                       |                          | Х                        |
|  | Probability and Statistics  | 5                 | Х                                       |                 |                            | Х               |                     |                        |                      | Х                   |                    |                              |                       |                          |                          |
|  | Object-Oriented Programming in IoT Devices                                      | 5                 |   | Х               |                            | Х               |                     |                        |                      | Х                   |                    |                              |                       |                          | X                        |
|  | Modern Computer Architecture  | 5                 |   | Х               |                            | Х               |                     |                        |                      | Х                   |                    |                              |                       |                          | Х                        |
|  | Mathematics and Physics for IoT   | 5                 | Х                                       |                 |                            |                 |                     |                        |                      | Х                   |                    |                              |                       |                          |                          |
|  | IoT Connecting Things   | 5                 |   | Х               |                            | Х               |                     | Х                      | Х                    | Х                   |                    |                              |                       |                          | Х                        |
|  | IoT Devices and Wireless Communication  | 5                 |   | Х               | Х                          | Х               |                     | Х                      | Х                    | Х                   |                    |                              | Х                     |                          | Х                        |
|  | Sensor Physics  | 5                 | Х                                       |                 |                            |                 |                     |                        |                      | Х                   |                    |                              |                       |                          |                          |
|  | Windows Servers   | 5                 |   | Х               | Х                          |                 |                     | Х                      |                      | Х                   |                    |                              |                       |                          | Х                        |
|  | Secure Enterprise Networks  | 5                 |   |                 | Х                          |                 |                     | Х                      |                      | Х                   |                    |                              |                       |                          | Х                        |
|  | IoT Security  | 5                 |   |                 | Х                          |                 |                     | Х                      |                      | Х                   | Х                  |                              |                       |                          | Х                        |
|  | Cloud Computing Fundamentals and Machine Learning                               | 5                 |   |                 | Х                          | Х               |                     | Х                      |                      | Х                   |                    |                              | Х                     |                          | Х                        |
|  | Enterprise Virtualization Configuration and Management Cybersecurity Operations | 5<br>5            |   |                 | X<br>X                     |                 |                     | X<br>X                 | Х                    | X                   | Х                  | Х                            |                       |                          | X                        |
| 3rd year of study                                      | loT Security  | 5                 |   | х               | X                          |                 |                     | X                      |                      | X                   | X                  |                              |                       |                          | X                        |
| ord year or study                                      | Managing Linux Systems with Embedded Perspective                                | 5                 |   | X               | X                          | Х               |                     | X                      |                      | X                   |                    |                              |                       |                          | X                        |
|  | ARM-Processors and Embedded Operating Systems                                   | 5                 |   | X               |                            | X               |                     |                        |                      | X                   |                    |                              |                       |                          | X                        |
|  | Embedded Linux Basics (Yocto Project)   | 5                 |   | X               | х                          | X               |                     | Х                      | х                    | X                   |                    | х                            | Х                     |                          | X                        |
|  | Software Test Automation for Embedded Systems                                   | 5                 |   | X               |                            | X               |                     | X                      | Α                    | X                   |                    | Α .                          |                       |                          | X                        |
|  | Amazon Web Services   | 5                 |   | ,               | Х                          | X               |                     | X                      |                      | X                   |                    |                              |                       |                          | X                        |
|  | Microservices and Container Orchestration                                       | 5                 |   |                 | Х                          | Х               |                     | Х                      |                      | Х                   |                    |                              | Х                     |                          | X                        |
|  | Ethical Hacking   | 5                 |   |                 |                            |                 |                     | Х                      | х                    | Х                   | Х                  |                              |                       |                          |                          |
|  | Introduction to Big Data Analytics  | 5                 |   |                 | Х                          | Х               |                     | Х                      |                      | Х                   |                    |                              | Х                     |                          | х                        |
|  | Practical Cybersecurity   | 5                 |   |                 | Х                          |                 |                     | Х                      |                      | Х                   |                    | Х                            |                       |                          |                          |
|  | IoT Project   | 10                | Х                                       |                 | Х                          | Х               |                     | Х                      | Х                    | Х                   |                    | Х                            | Х                     |                          | Х                        |