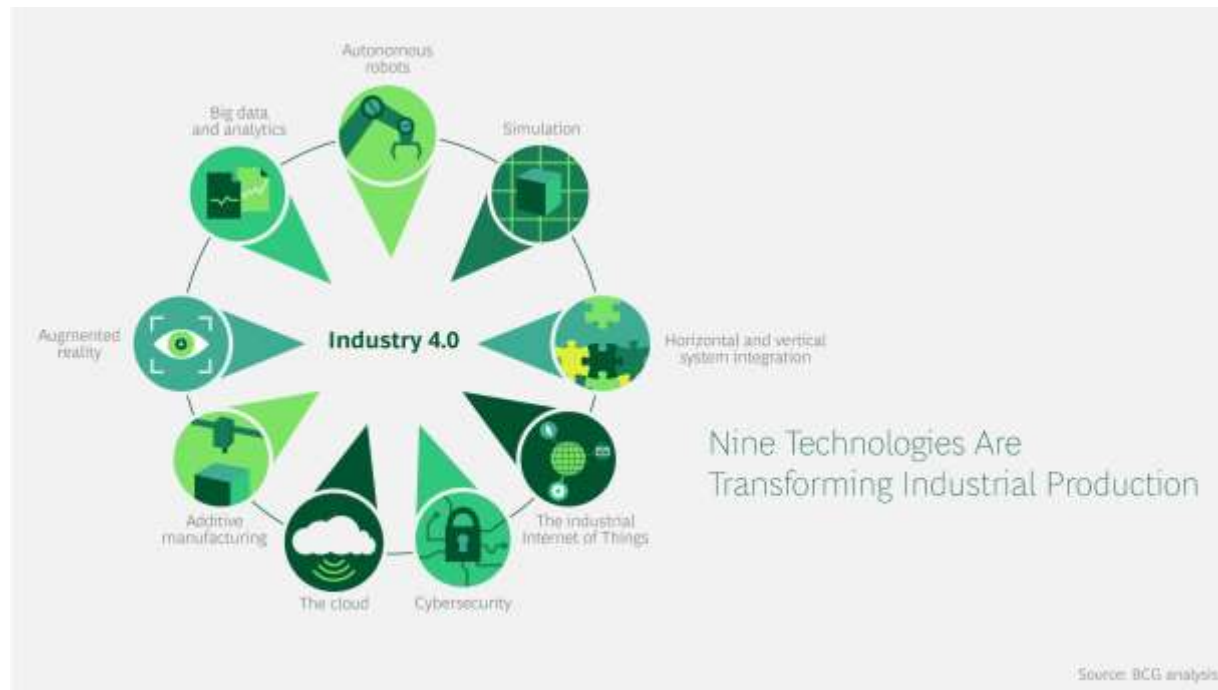


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November 2020

**Boosting the role of HEIs in the industrial transformation towards the Industry 4.0 paradigm in Georgia and Ukraine**  
**609939-EPP-1-2019-1-BE-EPPKA2-CBHE-JP**

**Study of teaching methodology and curriculum in relation to Industry 4.0**

Advanced digital technology is already used in manufacturing, but with Industry 4.0, it will transform production. It will lead to greater efficiencies and change traditional production relationships among suppliers, producers, and customers — as well as between human and machine. Nine technology trends form the building blocks of Industry 4.0. (Source: BCG analysis).



1. BIG DATA AND ANALYTICS
2. AUTONOMOUS ROBOTS
3. SIMULATION
4. HORIZONTAL AND VERTICAL SYSTEM INTEGRATION
5. THE INDUSTRIAL INTERNET OF THINGS
6. CYBERSECURITY
7. THE CLOUD
8. ADDITIVE MANUFACTURING
9. AUGMENTED REALITY

We have selected the curricula of the three European universities, Katholieke Universiteit Leuven (KUL), Kungliga Tekniska högskolan (KTH), Instituto Politécnico do Porto (IPP), that offer master's degrees in the programs that fall into the above mentioned nine directions.

| <b>EU University</b>                 | <b>Number of MSC Programs</b> |
|--------------------------------------|-------------------------------|
| Katholieke Universiteit Leuven (KUL) | 29                            |
| Kungliga Tekniska högskolan (KTH)    | 12                            |
| Instituto Politécnico do Porto (IPP) | 10                            |

| <b>Katholieke Universiteit Leuven</b>   |
|---|
| <b>Master of Energy Engineering</b> - Technology Campus Ghent                           |
| <b>Master of Energy Engineering</b> - Campus Bruges                                     |
| <b>Master of Energy Engineering</b> - Campus Diepenbeek                                 |
| <b>Master of Energy Engineering</b> - Campus Geel                                       |
| <b>Master of Elektromechanical Engineering</b> - Technology Campus Ghent                |
| <b>Master of Elektromechanical Engineering</b> - Campus Bruges                          |
| <b>Master of Elektromechanical Engineering</b> - Campus Diepenbeek                      |
| <b>Master of Elektromechanical Engineering</b> - Campus Geel                            |
| <b>Master of Elektromechanical Engineering</b> - Campus Group T Leuven                  |
| <b>Master of Elektromechanical Engineering</b> - Campus De Nayer - Sint-Katelijne Waver |
| <b>Master of Electronics and ICT Engineering</b> - Technology Campus Ghent              |
| <b>Master of Electronics and ICT Engineering</b> - Campus Bruges                        |
| <b>Master of Electronics and ICT Engineering</b> - Campus Diepenbeek                    |
| <b>Master of Electronics and ICT Engineering</b> - Campus Geel                          |
| <b>Master of Electronics and ICT Engineering</b> - Campus Group T Leuven                |

|   |
|---|
| <b>Master of Electronics and ICT Engineering - Campus De Nayer - Sint-Katelijne Waver</b> |
| <b>Advanced Master in Welding Engineering</b>   |
| <b>Advanced Master in Innovative Health Technology</b>                                    |
| <b>Master of Mechanical Engineering</b>   |
| <b>Master of Electrical engineering</b>   |
| <b>Master of Engineering: Computer Science</b>  |
| <b>Master of Energy Engineering</b>   |
| <b>Master of Materials Engineering</b>  |
| <b>Master of Mathematical Engineering</b>   |
| <b>Master of Statistics and Data Science</b>  |
| <b>Master of Astronomy and Astrophysics</b>   |
| <b>Master of Mathematics</b>  |
| <b>Advanced Master of Artificial Intelligence</b>   |
| <b>Master of Business engineering</b>   |

| <b>Name of Key Industry 4.0 Technology - Katholieke Universiteit Leuven</b>                             | <b>Number of Study Courses</b> |
|---|--------------------------------|
| BIG DATA  | <b>178</b>                     |
| AUTONOMOUS ROBOTS   | 48                             |
| SIMULATION  | <b>310</b>                     |
| SYSTEM INTEGRATION  | <b>362</b>                     |
| INTERNET OF THINGS  | <b>85</b>                      |
| CYBERSECURITY   | <b>60</b>                      |
| CLOUD COMPUTING   | <b>36</b>                      |
| ADDITIVE MANUFACTURING  | <b>35</b>                      |
| AUGMENTED REALITY   | <b>7</b>                       |
| <ul style="list-style-type: none"> <li>* Courses are duplicated among the programs/curricula</li> </ul> | <b>Total 291 in programs</b>   |

**Kungliga Tekniska högskolan**

**School of Electrical Engineering and Computer Science**

- Communication Systems
- Computer Science
- Embedded Systems
- ICT Innovation
- Information and Network Engineering
- Machine Learning
- Security and Cloud Computing (Joint Erasmus+)
- Software Engineering of Distributed Systems
- Systems, Control and Robotics

**School of Industrial Engineering and Management**

- Engineering Design
- Industrial Management
- Production Engineering and Management

**P.Porto**

**ISEP PORTO SCHOOL OF ENGINEERING**

- Master in Electrical and Computer Engineering - Automation and Systems
- Master in Electrical and Computer Engineering - Autonomous Systems
- Master in Electrical and Computer Engineering - Systems and Industry Planning
- Master in Electrical and Computer Engineering - Telecommunications
- Master in Informatics Engineering - Computer Systems
- Master in Informatics Engineering - Graphics Systems and Multimedia
- Master in Informatics Engineering - Information and Knowledge Systems
- Master in Informatics Engineering - Software Engineering
- Master in Mechanical Engineering - Industrial Management

**ESTG SCHOOL OF MANAGEMENT AND TECHNOLOGY**

- Master in Informatics Engineering

**Master's degree program Courses under the Industry 4.0 thematic  
Katholieke Universiteit Leuven**

| University   | Master's degree program Courses under the Industry 4.0 thematic<br>Katholieke Universiteit Leuven                            |  |   |  |  |                                     |                                    |                        |                   |
|--|--|--|---|--|--|-------------------------------------|------------------------------------|------------------------|-------------------|
|  | Big data and analytics   | Autonomous Robots  | Simulation  | Horizontal and vertical system integration   | The industrial internet of things  | Cybersecurity                       | The cloud                          | Additive manufacturing | Augmented reality |
| <p><b>KUL</b><br/>Master of Energy Engineering</p> <p><b>Technology</b></p> <p><b>Campus Ghent</b></p> | <p>Discrete Control Systems 2</p> <p>Wind Energy 1</p> <p>Modern Control Systems</p> <p>Neural Networks and Optimization</p> | <p>Robotics</p> <p>Electrical Drives</p> <p>Hydraulic drives</p> | <p>Additional Electronics</p> <p>Discrete Control Systems 2</p> <p>Electrical Drives</p> <p>Transport and Distribution of Electrical Energy</p> <p>Power Electronics 2</p> <p>Electrothermal Engineering</p> <p>Energetic Aspects of Energy Distribution</p> <p>Electrical Drives</p> <p>Object Oriented Programming</p> <p>Discrete Control Systems</p> <p>Wind Energy 1</p> <p>Electrothermal Engineering</p> | <p>Additional Electronics</p> <p>Additional Electronics</p> <p>Industrial Datacommunication</p> <p>Robotics</p> <p>Discrete Control Systems 2</p> <p>Electrical Drives</p> <p>Transport and Distribution of Electrical Energy</p> <p>Lighting 1</p> <p>Power Electronics 2</p> <p>Electrothermal Engineering</p> <p>Energetic Aspects of Energy Distribution</p> <p>Electrical Machines</p> <p>Electrical Drives</p> | <p>Industrial Datacommunication</p> <p>Robotics</p> <p>Lighting 1</p> <p>Object Oriented Programming</p> | <p>Industrial Datacommunication</p> | <p>Object Oriented Programming</p> |                        |                   |

|   |  |                                 |   |   |  |  |  |  |  |
|---|--|---------------------------------|---|---|--|--|--|--|--|
|   |  |                                 | <p>Modern Control Systems</p> <p>Neural Networks and Optimization</p>                                       | <p>Hydraulic drives</p> <p>Discrete Control Systems</p> <p>Wind Energy 1</p> <p>Electrothermal Engineering</p> <p>Lighting 2</p> <p>Industrial Datacommunication</p>  |  |  |  |  |  |
| <p><b>KUL</b></p> <p>Master of Energy Engineering</p> <p><b>Technology</b></p> <p><b>Campus Bruges</b></p> <p><b>Option Electrical Engineering - Renewable Energy</b></p> | <p>Wind Energy</p> <p>Solar Energy</p> | <p>Drives and Power Quality</p> | <p>Drives and Power Quality</p> <p>Wind Energy</p> <p>Solar Energy</p> <p>Electrical Grids and Domotics</p> | <p>Drives and Power Quality</p> <p>Power Electronics</p> <p>Electrical Engineering Lab</p> <p>Generators and Low Power Motors</p> <p>Combined Heat and power Plants</p> <p>Thermal and Hydraulic Plants</p> <p>Wind Energy</p> <p>Solar Energy</p> <p>Renewable Energy Lab</p> <p>Electrical Grids and Domotics</p> | <p>Generators and Low Power Motors</p> <p>Combined Heat and power Plants</p> <p>Thermal and Hydraulic Plants</p> |  |  |  |  |

|  |   |   |  |  |  |  |  |  |  |
|--|---|---|--|--|--|--|--|--|--|
| <p><b>KUL</b><br/>Master of Energy Engineering</p> <p><b>Campus Diepenbeek</b></p> | <p>Energy Management Systems</p> <p>Renewable Energy</p> <p>Design of Integrated Energy Systems</p> <p>Energy Markets</p> | <p>Robotics, Vision and Hydraulics 4 1</p> <p>Integrated Automation</p> | <p>Energy Management Systems</p> <p>Robotics, Vision and Hydraulics 4 1</p> <p>Integrated Automation</p> <p>Mechatronic Design</p> <p>Renewable Energy</p> <p>Thermal Engines</p> <p>Design of Integrated Energy Systems</p> <p>Mechanisms 3</p> <p>Vibrations 3</p> <p>Innovation in Materials Technology I</p> <p>Innovation in Materials Technology II</p> <p>Integrated Automation</p> | <p>Energy Management Systems</p> <p>Advanced Electrical Engineering</p> <p>Robotics, Vision and Hydraulics 4 1</p> <p>Integrated Automation</p> <p>Mechatronic Design</p> <p>Renewable Energy</p> <p>Thermal Engines</p> <p>Design of Integrated Energy Systems</p> <p>Mechanisms 3</p> <p>Vibrations 3</p> <p>Innovation in Materials Technology I</p> <p>Innovation in Materials Technology II</p> <p>Integrated Automation</p> <p>Fundamentals of Battery Engineering</p> |  |  |  | <p>Innovation in Materials Technology I</p> <p>Innovation in Materials Technology II</p> |  |
|--|---|---|--|--|--|--|--|--|--|

|   |  |   |  |   |                              |  |  |   |  |
|---|--|---|--|---|------------------------------|--|--|---|--|
| <p><b>KUL</b><br/>Master of Energy Engineering</p> <p><b>Campus Geel</b></p>                                  | <p>Sustainable Energy Systems</p> <p>Energy Markets</p> <p>Production and Distribution of Electrical Energy</p> <p>Thermal Systems</p> <p>Energy Systems: Design and Simulation Techniques</p> | <p>Electrical Drives</p>  | <p>Sustainable Energy Systems</p> <p>Electronic Power control</p> <p>Electrical Drives</p> <p>Electrical Design</p> <p>Production and Distribution of Electrical Energy</p> <p>Thermal Systems</p> <p>Energy Systems: Design and Simulation Techniques</p> | <p>Applied Thermodynamics</p> <p>Sustainable Energy Systems</p> <p>Electronic Power control</p> <p>Electrical Drives</p> <p>Energy in Buildings</p> <p>Electrical Design</p> <p>Production and Distribution of Electrical Energy</p> <p>Thermal Systems</p> <p>Energy Systems: Design and Simulation Techniques</p> | <p>Energy in Buildings</p>   |  |  |   |  |
| <p><b>KUL</b></p> <p><b>Master of Elektromechanical Engineering</b></p> <p><b>Technology Campus Ghent</b></p> | <p>Finite element Design</p> <p>Production Management</p>  | <p>Hydraulic Drives</p> <p>Servo Motors and Applications</p> <p>Industrial Automation</p> <p>Robotics</p> | <p>Hydraulic Drives</p> <p>Mechanical Vibrations</p> <p>Finite element Design</p> <p>Servo Motors and Applications</p> <p>Computer Controlled Production</p> <p>Production Project</p> <p>Numerically Controlled Design</p> <p>Maritime Techniques 1</p>   | <p>Hydraulic Drives</p> <p>Servo Motors and Applications</p> <p>Computer Controlled Production</p> <p>Production Project</p> <p>Material Choice in Mechanical Design</p> <p>Numerically Controlled Design</p>   | <p>Industrial Automation</p> |  |  | <p>Computer Controlled Production</p> <p>Production Project</p> |  |



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|---|--|---|---|--|--|--|--|---|--|
|   |  |   | Maritime Techniques 2<br>Industrial Automation<br>Robotics  | Maritime Techniques 1<br>Maritime Techniques 2<br>Industrial Automation<br>Robotics<br>Production Management   |  |  |  |   |  |
| <b>KUL</b><br><b>Master of Elektromechanical Engineering</b><br><b>Technology Campus Bruges</b> | Combined Heat and power Plants<br>Complex Mechanisms<br>Production Techniques and Management<br>Numerical Modelling<br>Atmospheric Flight Mechanics<br>Flight Systems and Drones | Mechatronics Lab<br>Industrial Robotics<br>Production Techniques and Management<br>Mechatronics Lab 2 | Structural Dynamics 5<br>Combined Heat and power Plants<br>Mechatronics Lab<br>Industrial Robotics<br>Energy Systems<br>Complex Mechanisms<br>Mechatronics Lab 2<br>Model-based System Design<br>Plane Constructions and Materials<br>Processing Composites/Laminate Theory<br>Numerical Modelling<br>Atmospheric Flight Mechanics<br>Plane Design Lab<br>Flight Systems and Drones | Mechatronics Lab<br>Industrial Robotics<br>Energy Systems<br>Mechatronics Lab 2<br>Model-based System Design<br>Processing Composites/Laminate Theory<br>Plane Design Lab<br>Flight Systems and Drones |  |  |  | Plane Constructions and Materials<br>Processing Composites/Laminate Theory<br>Plane Design Lab<br>Flight Systems and Drones |  |

|   |                          |   |   |   |   |  |  |   |  |
|---|--------------------------|---|---|---|---|--|--|---|--|
| <p><b>KUL</b></p> <p><b>Master of Elektromechanical Engineering</b></p> <p><b>Campus Diepenbeek</b></p> | <p>Electric Vehicles</p> | <p>Robotics, vision and hydraulics</p> <p>Electric Vehicles</p> | <p>Robotics, vision and hydraulics</p> <p>Thermal Engines</p> <p>Finite element methods</p> <p>Materials Selection and Plastic Metal Forming 3</p> <p>Mechanisms 3</p> <p>Vibrations 3</p> <p>Applied Mechanics, CNC</p> <p>Electric Vehicles</p> <p>Industrial Polymer Processing</p> <p>Computer Supported Production</p> <p>Computer Supported Mold Design</p> <p>Industrial Design of Polymer Products</p> <p>Advanced Electrical Engineering</p> <p>Innovation in Materials Technology</p> | <p>Robotics, vision and hydraulics</p> <p>Thermal Engines</p> <p>Materials Selection and Plastic Metal Forming 3</p> <p>Applied Mechanics, CNC</p> <p>Electric Vehicles</p> <p>Industrial Polymer Processing</p> <p>Computer Supported Production</p> <p>Computer Supported Mold Design</p> <p>Industrial Design of Polymer Products</p> <p>Advanced Electrical Engineering</p> |   |  |  | <p>Materials Selection and Plastic Metal Forming 3</p> <p>Industrial Polymer Processing</p> <p>Computer Supported Production</p> <p>Computer Supported Mold Design</p> <p>Industrial Design of Polymer Products</p> <p>Innovation in Materials Technology</p> |  |
| <p><b>KUL</b></p> <p><b>Master of Elektromechanical Engineering</b></p> <p><b>Campus Geel</b></p>       |                          | <p>Robotics</p> <p>Control Techniques</p>                       | <p>Applied Thermodynamics</p> <p>Robotics</p> <p>Material Technology</p> <p>Machine Construction</p> <p>Design</p> <p>Digital Control Systems</p>   | <p>Applied Thermodynamics</p> <p>Robotics</p> <p>Material Technology</p> <p>Machine Construction</p>  | <p>Process Automation</p> <p>Control Techniques</p> |  |  | <p>Material Technology</p> <p>Machine Construction</p> <p>Production Techniques and Management</p>  |  |

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|---|---|---|--|---|--|--|----------------------------|--|--|
|   |   |   | <p>Process Automation</p> <p>Control Techniques</p>  | <p>Production Techniques and Management</p> <p>Design</p> <p>Digital Control Systems</p> <p>Process Automation</p> <p>Control Techniques</p>  |  |  |                            |  |  |
| <p><b>KUL</b></p> <p><b>Master of Elektromechanical Engineering</b></p> <p><b>Campus Group T Leuven</b></p> | <p>Dynamic Aspects of Machine Construction</p> <p>Finite Element Based Design</p> <p>Computer-Aided Modelling and Simulation</p> <p>Manufacturing Optimisation and Dimensional Quality Control</p> <p>Applied Sustainability Assessment</p> | <p>Drive Systems</p> <p>Advanced Automation</p> <p>Robotics and Advanced Instrumentation</p> <p>Computer-Aided Modelling and Simulation</p> <p>Robotics and Advanced Instrumentation</p> <p>Advanced Manufacturing</p> <p>Autonomous Vehicles</p> | <p>Dynamic Aspects of Machine Construction</p> <p>Finite Element Based Design</p> <p>Drive Systems</p> <p>Advanced Automation</p> <p>Dynamic and biomechanics</p> <p>Robotics and Advanced Instrumentation</p> <p>Computer-Aided Modelling and Simulation</p> <p>Robotics and Advanced Instrumentation</p> <p>Embedded Control Systems</p> <p>Advanced Manufacturing</p> <p>Computer-Integrated Manufacturing</p> <p>Autonomous Vehicles</p> | <p>Dynamic Aspects of Machine Construction</p> <p>Drive Systems</p> <p>Advanced Automation</p> <p>Dynamic and biomechanics</p> <p>Robotics and Advanced Instrumentation</p> <p>Medical Equipment and Regulatory Affairs</p> <p>Computer-Aided Modelling and Simulation</p> <p>Robotics and Advanced Instrumentation</p> <p>Embedded Control Systems</p> <p>Advanced Manufacturing</p> | <p>Robotics and Advanced Instrumentation</p> <p>Embedded Control Systems</p> <p>Autonomous Vehicles</p> <p>Vehicle Design and Technology</p> |  | <p>Autonomous Vehicles</p> |  | <p>Robotics and Advanced Instrumentation</p> |

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|--|---------------------|--|--|--|--|--|--|--|--|
|  | Autonomous Vehicles |  | <p>Transportation and Mobility Management</p> <p>Vehicle Design and Technology</p>   | <p>Computer-Integrated Manufacturing</p> <p>Manufacturing Optimisation and Dimensional Quality Control</p> <p>Autonomous Vehicles</p> <p>Transportation and Mobility Management</p> <p>Vehicle Design and Technology</p>   |  |  |  |  |  |
| <p><b>KUL</b></p> <p><b>Master of Elektromechanical Engineering</b></p> <p><b>Campus De Nayer - Sint-Katelijne Waver</b></p> |                     | <p>Advanced Mechatronics for Manufacturing Engineering</p> <p>Advanced Manufacturing</p> <p>Product Transport and Handling Systems</p> <p>Mechatronics for Production Automation and Industrial Robotics</p> | <p>Electrical Drives</p> <p>Applied Automation</p> <p>Advanced Design Techniques</p> <p>Materials engineering for design and manufacturing</p> <p>Automotive Electronics</p> <p>Lightweight Materials for Transport Applications</p> <p>Vehicle Mechanics</p> <p>Advanced Mechatronics for Manufacturing Engineering</p> <p>Advanced Manufacturing</p> <p>Product Transport and Handling Systems</p> | <p>Electrical Drives</p> <p>Applied Automation</p> <p>Advanced Design Techniques</p> <p>Materials engineering for design and manufacturing</p> <p>Automotive Electronics</p> <p>Lightweight Materials for Transport Applications</p> <p>Vehicle Mechanics</p> <p>Advanced Mechatronics for Manufacturing Engineering</p> <p>Advanced Manufacturing</p> <p>Product Transport and Handling Systems</p> |  |  |  |  |  |

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|--|--|--|--|--|--|--|--|--|--|
|  |  |  | Mechatronics for<br>Production Automation<br>and Industrial Robotics | Mechatronics for<br>Production Automation<br>and Industrial Robotics |  |  |  |  |  |
|--|--|--|--|--|--|--|--|--|--|

|  |   |  |   |                                    |                              |                              |                              |                       |                     |
|--|---|--|---|------------------------------------|------------------------------|------------------------------|------------------------------|-----------------------|---------------------|
| <b>KUL</b><br><br><b>Master of</b><br><b>Electronics and</b><br><b>ICT Engineering</b><br><br><b>Technology</b><br><b>Campus Ghent</b> | Machine Learning Techniques               |  | Machine Learning Techniques               | Advanced Computer Architecture     | Sensors in Embedded Systems  | Sensors in Embedded Systems  | Sensors in Embedded Systems  |                       | Multimedia Networks |
|  | Artificial Intelligence                   |  | Elektromagnetic Waves and Antennas        | Sensors in Embedded Systems        | IoT Nodes                    | Distributed Systems          | IoT Nodes                    |                       |                     |
|  | Algorithms for Supporting Decision Making |  | Analog Design                             | IoT Nodes                          |                              |                              |                              | Distributed Systems   |                     |
|  | Optimization Techniques                   |  | Digital Signal Processing                 | Elektromagnetic Waves and Antennas | Sensors in Embedded Systems  | Mobile Applications          | Mobile Applications          |                       |                     |
|  | Software Simulation                       |  | Digital Image Processing                  | Analog Design                      | Distributed Systems          | Multimedia Networks          | Multimedia Networks          |                       |                     |
|  |   |  | Digital Audio Techniques                  | Digital Signal Processing          | Mobile Applications          | Optical Fiber Communications | Optical Fiber Communications | Distributed Systems 2 |                     |
|  |   |  | Elektromagnetic Waves and Antennas        | Digital Image Processing           | Multimedia Networks          | Mobile Communications        | Mobile Communications        | Mobile Applications   |                     |
|  |   |  | Digital Signal Processing                 | Digital Audio Techniques           | Optical Fiber Communications | Distributed Systems 1        | Distributed Systems 1        |                       |                     |
|  |   |  | Distributed Systems                       | Advanced Computer Architecture     | Mobile Communications        | Distributed Systems 2        | Distributed Systems 2        |                       |                     |
|  |   |  | Algorithms for Supporting Decision Making | Elektromagnetic Waves and Antennas | Distributed Systems 1        | Mobile Applications          | Mobile Applications          |                       |                     |
|  |   |  | Optimization Techniques                   | Digital Signal Processing          | Distributed Systems 2        |                              |                              |                       |                     |
|  |   |  |   | Sensors in Embedded Systems        | Mobile Applications          |                              |                              |                       |                     |
|  |   |  |   | Distributed Systems                |                              |                              |                              |                       |                     |
|  |   |  |   | Mobile Applications                |                              |                              |                              |                       |                     |
|  |   |  |   | Multimedia Networks                |                              |                              |                              |                       |                     |

|  |  |  |  |                                 |  |  |  |  |  |
|--|--|--|--|---------------------------------|--|--|--|--|--|
|  |  |  |  | Optical Fiber<br>Communications |  |  |  |  |  |
|  |  |  |  | Mobile Communications           |  |  |  |  |  |
|  |  |  |  | Distributed Systems 1           |  |  |  |  |  |
|  |  |  |  | Distributed Systems 2           |  |  |  |  |  |
|  |  |  |  | Mobile Applications             |  |  |  |  |  |

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|---|--|--|--|---|--|--|--|--|---|
| <p><b>KUL</b></p> <p><b>Master of Electronics and ICT Engineering</b></p> <p><b>Campus Bruges</b></p>     | <p>Applied DSP</p>   |  | <p>Computer Systems and Interfacing</p> <p>Applied DSP</p> <p>Power Electronics</p> <p>EMC-based Design</p> <p>Opto-electrical Communication</p> <p>Innovation in Materials Technology</p> | <p>Computer Systems and Interfacing</p> <p>Programming Techniques Lab</p> <p>Applied DSP</p> <p>Computer Architectures</p> <p>Power Electronics</p> <p>System Design with HDL</p> <p>EMC-based Design</p> <p>Opto-electrical Communication</p> <p>Web Technology and Web Programming</p> <p>Distributed Embedded Software Engineering 3</p> <p>Software Development Methodology 3 2</p> <p>Software Testing</p> | <p>Computer Systems and Interfacing</p> <p>Digital and Wireless Communication</p> <p>Programming Techniques Lab</p> <p>System Design with HDL</p> <p>Web Technology and Web Programming</p> <p>Distributed Embedded Software Engineering</p> | <p>Computer Systems and Interfacing</p> <p>Digital and Wireless Communication</p> <p>Web Technology and Web Programming</p> <p>Distributed Embedded Software Engineering</p> <p>Software Testing</p> | <p>Digital and Wireless Communication</p> <p>Web Technology and Web Programming</p> <p>Distributed Embedded Software Engineering</p> |  | <p>Computer Systems and Interfacing</p> |
| <p><b>KUL</b></p> <p><b>Master of Electronics and ICT Engineering</b></p> <p><b>Campus Diepenbeek</b></p> | <p>Embedded Systems</p> <p>Applications and Algorithms of Advanced Programming Languages</p> |  |  | <p>Networks and RF</p> <p>Embedded Systems</p> <p>Applications and Algorithms of Advanced Programming Languages</p>   | <p>Embedded Systems</p> <p>Applications and Algorithms of Advanced</p>   | <p>Networks and RF</p> <p>Embedded Systems</p>   | <p>Embedded Systems</p>  | <p>Innovation in Materials Technology</p> <p>SOA &amp; Cloud Computing</p> |   |



|  |                          |  |  |                                     |                                     |                              |  |  |  |
|--|--------------------------|--|--|-------------------------------------|-------------------------------------|------------------------------|--|--|--|
|  | DSP and Image Processing |  |  | DSP and Image Processing            | Programming Languages               | Coding Theory and Cryptology |  |  |  |
|  | E-Health                 |  |  | Coding Theory and Cryptology        | DSP and Image Processing            | SOA & Cloud Computing        |  |  |  |
|  | Machine Learning         |  |  | Advanced Chip Design                | Coding Theory and Cryptology        |                              |  |  |  |
|  |                          |  |  | Nano Electronics                    | Advanced Chip Design                |                              |  |  |  |
|  |                          |  |  | Fundamentals of Battery Engineering | Fundamentals of Battery Engineering |                              |  |  |  |
|  |                          |  |  | E-Health                            | E-Health                            |                              |  |  |  |
|  |                          |  |  | Innovation in Materials Technology  | HW/SW co-design                     |                              |  |  |  |
|  |                          |  |  | Machine Learning                    | Real-time Operating Systems         |                              |  |  |  |
|  |                          |  |  | HW/SW co-design                     | Advanced Analog Design              |                              |  |  |  |
|  |                          |  |  | Real-time Operating Systems         | SOA & Cloud Computing               |                              |  |  |  |
|  |                          |  |  | Advanced Analog Design              | Innovation in Materials Technology  |                              |  |  |  |
|  |                          |  |  | SOA & Cloud Computing               |                                     |                              |  |  |  |
|  |                          |  |  | Innovation in Materials Technology  |                                     |                              |  |  |  |

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|  |                          |  |                                    |                                    | SOA & Cloud Computing              |                              |                              |                          |                |  |
| <b>KUL</b><br><br><b>Master of Electronics and ICT Engineering</b><br><br><b>Campus Campus Geel</b>    | Big Data Analysis        |  | Big Data Analysis                  | Telecommunication                  | Telecommunication                  | Software Engineering         | Software Engineering         |                          |                |  |
|  | Machine Learning         |  | Machine Learning                   | Embedded Systems                   | Embedded Systems                   | Networks                     |                              |                          |                |  |
|  | Software Engineering     |  | Digital Chip Design                | Digital Chip Design                | Digital Chip Design                |                              |                              |                          |                |  |
|  | Environmental Technology |  | Analog and Mixed-signal Design     | Analog and Mixed-signal Design     | RF and PLL Design                  |                              |                              |                          |                |  |
|  | Software Engineering     |  | RF and PLL Design                  | RF and PLL Design                  | Digital and Wireless Communication |                              |                              |                          |                |  |
|  | Environmental Technology |  | Power Electronics                  | Power Electronics                  | Networks                           |                              |                              |                          |                |  |
|  | Software Engineering     |  | Software Engineering               | Software Engineering               |                                    |                              |                              |                          |                |  |
|  | Environmental Technology |  | Environmental Technology           | Environmental Technology           |                                    |                              |                              |                          |                |  |
|  | Software Engineering     |  | Software Engineering               | Software Engineering               |                                    |                              |                              |                          |                |  |
|  | Environmental Technology |  | Digital and Wireless Communication | Digital and Wireless Communication |                                    |                              |                              |                          |                |  |
|  |                          |  | Digital Chip Design                | Networks                           |                                    |                              |                              |                          |                |  |
|  |                          |  |                                    | Digital Chip Design                |                                    |                              |                              |                          |                |  |
|  |                          |  |                                    | Environmental Technology           |                                    |                              |                              |                          |                |  |
| <b>KUL</b><br><br><b>Master of Electronics and ICT Engineering</b><br><br><b>Campus Group T Leuven</b> | Machine learning         |  | R&D Experience                     | Ubiquitous Computing Systems       | Ubiquitous Computing Systems       | Ubiquitous Computing Systems | Ubiquitous Computing Systems |                          | R&D Experience |  |
|  | R&D Experience           |  | Power Electronics                  | R&D Experience                     | R&D Experience                     | R&D Experience               | R&D Experience               |                          |                |  |
|  | Media Processing         |  | Hardware Design                    | Power Electronics                  | Power Electronics                  | Distributed Applications     | Distributed Applications     |                          |                |  |
|  |                          |  |                                    | Hardware Design                    | Hardware Design                    | Distributed Applications     | Distributed Applications     | Distributed Applications |                |  |
|  |                          |  |                                    | Media Processing                   | Media Processing                   |                              |                              |                          |                |  |

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|   |  |  |  | Distributed Applications  |   |   |  |                          |  |
|   |  |  |  | Distributed Applications  |   |   |  |                          |  |
| <b>KUL</b><br><b>Master of Electronics and ICT Engineering</b><br><b>Campus De Nayer - Sint-Katelijne Waver</b> | Digital Signal Processing<br><br>Digital Systems<br><br>Vision Systems<br><br>Product Certification<br><br>Speech Processing and Compression<br><br>RF design<br><br>Artificial Intelligence |  | Digital Signal Processing<br><br>Digital Systems<br><br>Vision Systems<br><br>Distributed Systems<br><br>Speech Processing and Compression<br><br>RF design<br><br>Application Architecturs<br><br>Operating Systems | Digital Signal Processing<br><br>Digital Systems<br><br>Vision Systems<br><br>Distributed Systems<br><br>Product Certification<br><br>Communication Systems<br><br>Speech Processing and Compression<br><br>RF design<br><br>Application Architecturs<br><br>Operating Systems<br><br>Industrial Networks | Distributed Systems<br><br>Application Architecturs | Distributed Systems<br><br>Application Architecturs | Distributed Systems<br><br>Communication Systems<br><br>Application Architecturs | Application Architecturs |  |
| <b>KUL</b><br><b>Advanced Master in Welding Engineering</b>   |  |  |  | Welding Processes and Equipment<br><br>Construction and Design<br><br>Fabrication, Applications Engineering   |   |   |  |                          |  |

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|  |  |  |  | Materials and their Behaviour during Welding   |                                 |  |  |  |  |
| <b>KUL</b><br><b>Advanced Master in Innovative Health Technology</b> | Information processing in Health Technology  | Health Engineering Experience<br><br>Robotics and Advanced Instrumentation   | Information processing in Health Technology<br><br>Robotics and Advanced Instrumentation<br><br>Sensors and Circuits for Healthcare Applications   | Health Engineering Experience<br><br>Human-Computer Interaction for Health<br><br>Information processing in Health Technology<br><br>Robotics and Advanced Instrumentation<br><br>Sensors and Circuits for Healthcare Applications   |                                 |  |  |  | Health Engineering Experience<br><br>Human-Computer Interaction for Health |
| <b>KUL</b><br><b>Master of Mechanical Engineering</b>                | Numerical Modelling in Mechanical Engineering<br><br>Theory of Elasticity and Plasticity<br><br>Sensors and Measurement Systems<br><br>Control theory Systems and Control Theory<br><br>Deterministic Decision Models<br><br>Introduction to Operational | Mechanical Drive Systems<br><br>Production Systems: Machine Tools Flexible Computer Integrated Production<br><br>Advanced Model Based Control<br><br>Production Machines and Systems<br><br>Advanced Robot Control Systems Robotics<br><br>Drive Systems | Numerical Modelling in Mechanical Engineering Mechanical Drive Systems<br><br>Theory of Elasticity and Plasticity<br><br>Sensors and Measurement Systems<br><br>Control theory Systems and Control Theory<br><br>Deterministic Decision Models<br><br>Design and Analysis of Experimentation<br><br>Production Systems: Machine Tools, Flexible Computer Integrated Production<br><br>Total Quality Management | Numerical Modelling in Mechanical Engineering Mechanical Drive Systems<br><br>Sensors and Measurement Systems<br><br>Control theory Systems and Control Theory<br><br>Introduction to Operational Management and Logistics<br><br>Design and Analysis of Experimentation<br><br>Production Systems: Machine Tools, Flexible Computer Integrated Production<br><br>Advanced Subtractive Manufacturing<br><br>Advanced Model Based Control | Sensors and Measurement Systems |  |  | Production Systems: Machine Tools, Flexible Computer Integrated Production<br><br>Additive Manufacturing Processes - 3D Printing |  |

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|  | Management and Logistics                          | Electrical Drives         | Virtual Product Development                       | Production Machines and Systems                                 |  |  |  |  |  |
|  | Engineering Economy                               | Mechatronic Drive Systems | Advanced Model Based Control                      | Optimization of Mechatronic Systems                             |  |  |  |  |  |
|  | Design and Analysis of Experimentation            |                           | Production Machines and Systems                   | Advanced Robot Control Systems                                  |  |  |  |  |  |
|  | Total Quality Management                          |                           | Optimization of Mechatronic Systems               | Robotics  |  |  |  |  |  |
|  | Virtual Product Development                       |                           | Advanced Robot Control Systems                    | Embedded Control Systems  |  |  |  |  |  |
|  | Optimization of Mechatronic Systems               |                           | Uncertainty in Artificial Intelligence            | Electrical Drives   |  |  |  |  |  |
|  | Uncertainty in Artificial Intelligence            |                           | Robotics  | Micro-electromechanical Systems                                 |  |  |  |  |  |
|  | Image Analysis and Understanding Aerodynamics     |                           | Embedded Control Systems                          | Image Analysis and Understanding Drive Systems                  |  |  |  |  |  |
|  | Numerical Techniques in Fluid Dynamics            |                           | Electrical Drives                                 | Tribology   |  |  |  |  |  |
|  | Turbulence  |                           | Image Analysis and Understanding Drive Systems    | Precision Engineering and Optics                                |  |  |  |  |  |
|  | Advanced Measurement Techniques in Fluid Dynamics |                           | Precision Engineering and Optics                  | Nuclear Energy: Basic Aspects                                   |  |  |  |  |  |
|  |   |                           | Aerodynamics                                      | Nuclear Energy: Deepening Insights                              |  |  |  |  |  |
|  |   |                           | Numerical Techniques in Fluid Dynamics            | Advanced Measurement Techniques in Fluid Dynamics               |  |  |  |  |  |
|  |   |                           | Turbulence  | Physics of Nuclear Reactors                                     |  |  |  |  |  |
|  |   |                           | Advanced Measurement Techniques in Fluid Dynamics | Physics of Nuclear Reactors                                     |  |  |  |  |  |
|  |   |                           | Physics of Nuclear Reactors                       | Turbomachinery, part 2  |  |  |  |  |  |
|  |   |                           | Turbomachinery, part 2                            | Energy Challenges   |  |  |  |  |  |
|  |   |                           | Advanced Thermodynamics and Plasma Physics        | Thermal Systems   |  |  |  |  |  |
|  |   |                           | Thermal Systems                                   | Aircraft Engines  |  |  |  |  |  |
|  |   |                           | Spacecraft Technology and Space Environment       | Aircraft MRO, Maintenance, Repair & Overhaul                    |  |  |  |  |  |
|  |   |                           | Aircraft Engines                                  | Advanced Techniques for Vibro-acoustic Measurement and Analysis |  |  |  |  |  |
|  |   |                           | Aerodynamics                                      | Electrical Drives   |  |  |  |  |  |

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|   | <p>Energy Challenges</p> <p>Spacecraft Technology and Space Environment</p> <p>Aerodynamics Production and Quality Assurance Processes in the Aerospace Industry</p> <p>Aircraft Performance and Stability</p> <p>Advanced Techniques for Vibro-acoustic Measurement and Analysis</p> <p>Reliability of Mechanical Systems</p> |  | <p>Aircraft Performance and Stability<br/>Structural Dynamics, Analysis and Numerical Modelling<br/>Advanced Techniques for Vibro-acoustic Measurement and Analysis</p> <p>Automotive Structures and Vehicle Dynamics<br/>Electrical Drives<br/>Noise Abatement in Machines, Vehicles and Aircraft<br/>Mechatronic Drive Systems<br/>Vehicle Propulsion</p> | <p>Noise Abatement in Machines, Vehicles and Aircraft<br/>Mechatronic Drive Systems</p>   |   |   |   |  |  |
| <b>Master of Electrical engineering</b> | <p>Digital Signal Processing for Communications and Information<br/>Analog and Mixed-Signal Electronics for Signal Processing</p>  | <p>Digital Signal Processing for Communications and Information<br/>Power Electronics<br/>Electrical Drives: Advanced Topics in Electrical Machines, including</p> | <p>Digital Signal Processing for Communications and Information<br/>Analog and Mixed-Signal Electronics for Signal Processing<br/>Design of Digital Platforms<br/>Design and Implementation of Analog Circuits</p>  | <p>Digital Signal Processing for Communications and Information<br/>Analog and Mixed-Signal Electronics for Signal Processing<br/>Design of Digital Platforms</p> | <p>Digital Signal Processing for Communications and Information<br/>Computer Architectures<br/>Design of Analog and</p> | <p>Digital Signal Processing for Communications and Information<br/>Hardware Security<br/>Digital Signal Processing</p> | <p>Digital Signal Processing for Communications and Information<br/>Hardware Security<br/>Digital Signal Processing</p> | <p>Digital Signal Processing for Communications and Information<br/>Telecommunications and Security<br/>Management</p> | <p>Digital Signal Processing for Communications and Information<br/>Design of Analog and Mixed-Signal Integrated Circuits<br/>Computer-Aided IC Design</p> |

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|  | <p>Compute Platforms for AI and Embedded Processing</p> <p>Digital Signal Processing for Communications and Information Systems</p> <p>Analog and Mixed-Signal Electronics for Signal Processing</p> <p>Analysis of Digital Communication Systems</p> <p>Design and Management of Electric Power Systems</p> <p>Data Mining and Neural Networks</p> <p>Digital Signal Processing for Communications and Information Systems</p> <p>Analog and Mixed-Signal Electronics for Signal Processing</p> | <p>Implementation Aspects</p> <p>Software for Real-Time Control</p> | <p>Design of Digital Integrated Circuits</p> <p>Computer-Aided IC Design</p> <p>Compute Platforms for AI and Embedded Processing</p> <p>MEMS and Microsystems</p> <p>Design of RF and mm-Wave Integrated Circuits</p> <p>Hardware Security</p> <p>Power Electronics</p> <p>Power System Calculations</p> <p>Digital Signal Processing for Communications and Information Systems</p> <p>Analog and Mixed-Signal Electronics for Signal Processing</p> <p>Analysis of Digital Communication Systems</p> <p>Electrical Drives: Advanced Topics in Electrical Machines, including Implementation Aspects</p> <p>Smart Distribution Systems</p> <p>Building Blocks for Telecom Systems</p> <p>Industrial Automation and Control</p> <p>Data Mining and Neural Networks</p> <p>Flexible Electrical Power Systems</p> <p>Digital Signal Processing for Communications and Information Systems</p> | <p>Design and Implementation of Analog Circuits</p> <p>Computer Architectures</p> <p>Design of Analog and Mixed-Signal Integrated Circuits</p> <p>Technology for Microelectronics</p> <p>Design of Digital Integrated Circuits</p> <p>Computer-Aided IC Design</p> <p>Compute Platforms for AI and Embedded Processing</p> <p>MEMS and Microsystems</p> <p>Design of RF and mm-Wave Integrated Circuits</p> <p>Software for Real-Time Control</p> <p>Hardware Security</p> <p>Power Systems</p> <p>Power Electronics</p> <p>Power System Calculations</p> <p>Digital Signal Processing for Communications and Information Systems</p> <p>Analog and Mixed-Signal Electronics for Signal Processing</p> <p>Electrical Drives: Advanced Topics in Electrical Machines, including</p> | <p>Mixed-Signal Integrated Circuits</p> <p>Computer-Aided IC Design</p> <p>MEMS and Microsystems</p> <p>Digital Signal Processing for Communications and Information Systems</p> <p>Analysis of Digital Communication Systems</p> <p>Smart Distribution Systems</p> <p>Design and Management of Electric Power Systems</p> <p>Digital Signal Processing for Platforms</p> <p>Building Blocks for Telecom Systems</p> <p>Industrial Automation and Control</p> <p>Digital Signal Processing</p> | <p>for Communications and Information Systems</p> <p>Smart Distribution Systems</p> <p>Building Blocks for Telecom Systems</p> <p>Digital Signal Processing for Communications and Information Systems</p> <p>Building Blocks for Telecom Systems</p> <p>Cryptography and Network Security</p> <p>Cryptography and Network Security</p> <p>Digital Signal Processing for Communications and Information Systems</p> <p>Building Blocks for</p> | <p>for Communications and Information Systems</p> <p>Smart Distribution Systems</p> <p>Building Blocks for Telecom Systems</p> <p>Digital Signal Processing for Communications and Information Systems</p> <p>Building Blocks for Telecom Systems</p> <p>Cryptography and Network Security</p> <p>Cryptography and Network Security</p> <p>Digital Signal Processing for Communications and Information Systems</p> <p>Building Blocks for</p> | <p>Privacy Technologies</p> <p>e-Security</p> <p>Software Defined Radio and Networking</p> |  |
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|  | <p>Data Mining and Neural Networks<br/>         Compute Platforms for AI and Embedded Processing<br/>         Digital Signal Processing for Communications and information Systems<br/>         Analog and Mixed-Signal Electronics for Signal Processing</p> |  | <p>Analog and Mixed-Signal Electronics for Signal Processing<br/>         Data Mining and Neural Networks<br/>         Software for Real-Time Control<br/>         Compute Platforms for AI and Embedded Processing<br/>         Building Blocks for Telecom Systems<br/>         Digital Signal Processing for Communications and information Systems<br/>         Analog and Mixed-Signal Electronics for Signal Processing<br/>         Building Blocks for Telecom Systems<br/>         Software for Real-Time Control<br/>         Advanced Methods in Cryptography</p> | <p>Implementation Aspects<br/>         Smart Distribution Systems<br/>         Design and Management of Electric Power Systems<br/>         Design of Digital Platforms<br/>         Building Blocks for Telecom Systems<br/>         Industrial Automation and Control<br/>         Flexible Electrical Power Systems<br/>         Digital Signal Processing for Communications and Information Systems<br/>         Analog and Mixed-Signal Electronics for Signal Processing<br/>         Design of Digital Platforms<br/>         Computer Architectures<br/>         Software for Real-Time Control<br/>         Compute Platforms for AI and Embedded Processing<br/>         Building Blocks for Telecom Systems<br/>         Cryptography and Network Security<br/>         Cryptography and Network Security<br/>         Digital Signal Processing for Communications and information Systems</p> | <p>for Communications and Information Systems<br/>         Design of Digital Platforms<br/>         Computer Architectures<br/>         Software for Real-Time Control<br/>         Building Blocks for Telecom Systems<br/>         Cryptography and Network Security<br/>         Cryptography and Network Security<br/>         Digital Signal Processing for Communications and information Systems<br/>         Building Blocks for Telecom Systems<br/>         Design of Digital Platforms</p> | <p>Telecom Systems Hardware Security<br/>         Telecommunications and Security Management Privacy Technologies<br/>         e-Security Advanced Methods in Cryptography<br/>         Multimedia Technology and Coding<br/>         Computer Algebra for Cryptography<br/>         Software Defined Radio and Networking</p> | <p>Telecom Systems Hardware Security<br/>         Telecommunications and Security Management Privacy Technologies<br/>         e-Security Advanced Methods in Cryptography<br/>         Multimedia Technology and Coding<br/>         Computer Algebra for Cryptography<br/>         Software Defined Radio and Networking</p> |  |  |
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|   |  |  |  | <p>Analog and Mixed-Signal Electronics for Signal Processing</p> <p>Building Blocks for Telecom Systems</p> <p>Design of Digital Platforms</p> <p>Computer Architectures</p> <p>Hardware Security</p> <p>Privacy Technologies</p> <p>e-Security</p> <p>Software for Real-Time Control</p> <p>Advanced Methods in Cryptography</p> <p>Multimedia Technology and Coding</p> <p>Computer Algebra for Cryptography</p> <p>Software Defined Radio and Networking</p> | <p>Computer Architectures</p> <p>Hardware Security</p> <p>Telecommunications and Security</p> <p>Management</p> <p>Software for Real-Time Control</p>  |   |   |  |  |
| <p><b>KUL</b></p> <p><b>Master of Engineering: Computer Science</b></p> | <p>Principles of Machine Learning</p> <p>Fundamentals for Computer Science</p> <p>Data Mining</p> <p>Genetic Algorithms and Evolutionary Computing</p> <p>Knowledge Representation</p> |  | <p>Principles of Machine Learning</p> <p>Software Architecture</p> <p>Fundamentals for Computer Science</p> <p>Modelling of Complex Systems</p> <p>Development of Secure Software</p> <p>Security of Network and Computer Infrastructure</p> <p>Formal Systems and their Applications</p> <p>Cryptography and Network Security</p> | <p>Design of Software Systems</p> <p>Declarative Languages</p> <p>Distributed Systems</p> <p>Software Architecture</p> <p>Fundamentals for Computer Science</p> <p>Comparative Programming Languages</p> <p>Modelling of Complex Systems</p> <p>Development of Secure Software</p> <p>Security of Network and Computer Infrastructure</p> <p>Formal Systems and their Applications</p>  | <p>Design of Software Systems</p> <p>Distributed Systems</p> <p>Development of Secure Software</p> <p>Security of Network and Computer Infrastructure</p> <p>Formal Systems and their Applications</p> | <p>Distributed Systems</p> <p>Development of Secure Software</p> <p>Security of Network and Computer Infrastructure</p> <p>Formal Systems and their Applications</p> <p>Software for Real-time and Embedded Systems</p> | <p>Information Retrieval and Search Engines</p> |  |  |

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|   | <p>Information Retrieval and Search Engines</p> <p>Advanced Programming Languages for A.I.</p> <p>Big Data Analytics Programming</p>  |  |  | <p>Software for Real-time and Embedded Systems</p> <p>Internet Infrastructure</p> <p>Cryptography and Network Security</p> <p>Data Mining Knowledge Representation</p> <p>Big Data Analytics Programming</p>   | <p>Internet Infrastructure</p>  | <p>Internet Infrastructure</p> <p>Cryptography and Network Security</p> |                      |  |  |
| <p><b>KUL</b></p> <p><b>Master of Engineering: Computer Science</b></p> | <p>Numerical Methods in Energy Sciences</p> <p>Electrical Drives: Advanced Topics in Electrical Machines, including implementation Aspect</p> <p>Energy Markets and Regulation</p> <p>Energy Economics</p> <p>Energy Challenges</p> <p>Aerodynamics Numerical</p> | <p>Power Electronics</p> <p>Mechanical Drive Systems</p> | <p>Power Electronics</p> <p>Power System Calculations</p> <p>Mechanical Drive Systems</p> <p>Numerical Methods in Energy Sciences</p> <p>Renewable Energy Smart Distribution Systems</p> <p>Thermal Systems</p> <p>Design and Management of Electric Power Systems</p> <p>Electromobily</p> <p>Industrial Automation and Control</p> | <p>Power Systems</p> <p>Power Electronics</p> <p>Power System Calculations</p> <p>Mechanical Drive Systems</p> <p>Nuclear Energy: Basic Aspects</p> <p>Electrical Drives: Advanced Topics in Electrical Machines, including implementation Aspect</p> <p>Energy Markets and Regulation</p> <p>Energy Economics</p> <p>Renewable Energy</p> <p>Smart Distribution Systems</p> | <p>Electrical Drives: Advanced Topics in Electrical Machines, including implementation Aspect</p> <p>Smart Distribution Systems Electromobily</p> | <p>Smart Distribution Systems Electromobily</p>                         | <p>Electromobily</p> |  |  |

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|   | <p>Techniques in Fluid Dynamics</p> <p>Turbulence</p> <p>Environmental and Transportation Economics</p> <p>Optimization Problems in Energy Systems</p> <p>Electricity and Gas Markets</p> |  | <p>Light and Lighting Systems</p> <p>Materials in Electrical Engineering</p> <p>Electromagnetic Processing of Materials</p> <p>Flexible Electrical Power Systems</p> <p>Aerodynamics</p> <p>Numerical Techniques in Fluid Dynamics</p> <p>Turbulence</p> <p>Aircraft Engines</p> <p>Turbomachinery, part 2</p> <p>Advanced Thermodynamics and Plasma Physics</p> | <p>Thermal Systems</p> <p>Design and Management of Electric Power Systems</p> <p>Electromobily</p> <p>Industrial Automation and Control</p> <p>Measurement and Testing, including High Voltages</p> <p>Light and Lighting Systems</p> <p>Materials in Electrical Engineering</p> <p>Electromagnetic Processing of Materials</p> <p>Flexible Electrical Power Systems</p> <p>Aircraft Engines</p> <p>Nuclear Energy: Deepening Insights</p> <p>Physics of Nuclear Reactors</p> <p>Turbomachinery, part 2</p> <p>Optimization Problems in Energy Systems</p> |  |  |  |  |  |
| <p><b>KUL</b></p> <p><b>Master of Materials Engineering</b></p> |   |  | <p>Material Characterisation Techniques</p> <p>Materials Modelling and Simulation Techniques</p>   |  |  |  |  |  |  |

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| <p><b>KUL</b></p> <p><b>Master of Mathematical Engineering</b></p> | <p>Optimization System Identification and Modelling</p> <p>Nonlinear Systems</p> <p>Data Mining and Neural Networks</p> <p>Methods and Algorithms for Advanced Process Control</p> <p>Computer Algebra for Cryptography</p> <p>Model Predictive Control</p> <p>Statistical Analysis</p> <p>Support Vector Machines: Methods and Applications</p> <p>Wavelets with Applications in Signal and Image Processing</p> |  | <p>Nonlinear Systems</p> <p>Data Mining and Neural Networks</p> <p>Methods and Algorithms for Advanced Process Control</p> <p>Model Predictive Control</p> <p>Statistical Analysis</p> <p>Support Vector Machines: Methods and Applications</p> <p>Wavelets with Applications in Signal and Image Processing</p> | <p>Scientific Software Nonlinear Systems</p> <p>Methods and Algorithms for Advanced Process Control</p> <p>Software for Real-Time Control</p> <p>Model Predictive Control</p> <p>Measurement of physical quantities Parallel Computing</p> <p>Wavelets with Applications in Signal and Image Processing</p> |  | <p>Computer Algebra for Cryptography</p> <p>Cryptography and Network Security</p> <p>Privacy Technologies</p> <p>Advanced Methods in Cryptography</p> |  |  |  |
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| <p><b>KUL</b></p> <p><b>Master of Statistics and Data Science</b></p> | <p>Fundamental Concepts of Statistics</p> <p>Statistical Software</p> <p>Multivariate Statistics</p> <p>Linear Models</p> <p>Generalized Linear Models</p> <p>Modern Data Analytics</p> <p>Epidemiology</p> <p>Data Mining and Neural Netowrks</p> <p>Data Management</p> <p>Support Vector Machines: Methods and Applications</p> <p>Concepts of Bayesian Data Analysis</p> <p>Meta Analysis</p> <p>Concepts of Multilevel, Longitudinal</p> |  | <p>Statistical Software</p> <p>Linear Models</p> <p>Generalized Linear Models</p> <p>Data Mining and Neural Netowrks</p> <p>Support Vector Machines: Methods and Applications</p> <p>Concepts of Bayesian Data Analysis</p> <p>Data Visualization in Data Science</p> <p>Stochastic Models</p> | <p>Statistical Software</p> <p>Data Visualization in Data Science</p> <p>Collecting and Analyzing Big Data</p> |  |  | <p>Data Mining and Neural Netowrks</p> <p>Data Management</p> <p>Support Vector Machines: Methods and Applications</p> |  |  |
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|   | <p>and Mixed Models</p> <p>Advanced Analytics in a Big Data World</p> <p>Data Visualization in Data Science</p> <p>Collecting and Analyzing Big Data</p> <p>Stochastic Models</p>                              |  |  |  |  |  |   |  |  |
| <p><b>KUL</b></p> <p><b>Master of Statistics and Data Science</b></p> | <p>Data Analysis in Astronomy and Physics</p> <p>Computational Methods for Astrophysical Applications</p>  |  | <p>Observational Techniques in Astronomy</p> <p>Computational Methods for Astrophysical Applications</p> | <p>Observational Techniques in Astronomy</p> <p>Computational Methods for Astrophysical Applications</p> |  |  | <p>Computational Methods for Astrophysical Applications</p> |  |  |
| <p><b>KUL</b></p> <p><b>Master of Mathematics</b></p>                 | <p>Optimization</p> <p>Computational Methods for Astrophysical Applications</p> <p>Robust Statistics</p> <p>Advanced Statistical Methods</p> <p>Statistical Data Analysis</p> <p>Generalized Linear Models</p> |  | <p>Computational Methods for Astrophysical Applications</p>  | <p>Computational Methods for Astrophysical Applications</p>  |  |  |   |  |  |

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|---|---|--|--|--|----------------------|--|--|--|--|
|   | Statistical Modelling   |  |  |  |                      |  |  |  |  |
|   | Advanced Analytics in a Big Data World  |  |  |  |                      |  |  |  |  |
| <b>KUL</b><br><b>Advanced Master of Artificial Intelligence</b> | <p>Fundamentals of Artificial Intelligence</p> <p>Privacy and Big Data</p> <p>Language Engineering Applications</p> <p>Privacy and Big Data</p> <p>Data and Statistical Modelling</p> <p>Big Data Analytics Programming</p> <p>Machine Learning and Inductive Interference</p> <p>Data Mining Uncertainty in Artificial Intelligence</p> <p>Artificial Neural</p> |  | <p>Fundamentals of Artificial Intelligence</p> <p>Privacy and Big Data</p> <p>Machine Learning and Inductive Interference</p> <p>Language Engineering Applications</p> <p>Uncertainty in Artificial Intelligence</p> <p>Artificial Neural Networks and Deep Learning</p> <p>Neural Computing</p> <p>Support Vector Machines: Methods and Applications</p> <p>Robotics</p> <p>Computer Vision</p> | <p>Programming Languages and Programming Methodologies</p> <p>Privacy and Big Data</p> <p>Basic Programming</p> <p>Scripting Languages</p> <p>Language Engineering Applications</p> <p>Programming Languages and Programming Methodologies</p> <p>Privacy and Big Data</p> <p>Data Mining</p> <p>Robotics</p> <p>Computer Vision</p> | Privacy and Big Data |  |  |  |  |

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|--|--|--|--|---|--|--|--|--|--|
|  | <p>Networks and Deep Learning<br/>Neural Computing</p> <p>Support Vector Machines: Methods and Applications<br/>Robotics</p> <p>Computer Vision</p> <p>Advanced Programming Languages for A.I.</p>   |  |  |   |  |  |  |  |  |
| <p><b>KUL</b></p> <p><b>Master of Business engineering</b></p> | <p>Energy Technology and Energy Economy</p> <p>Application of Statistics</p> <p>Simulation Theory and Applications</p> <p>Advanced Time Series Analysis<br/>Multivariate Statistics</p> <p>Machine Learning and Inductive Interference</p> |  | <p>Energy Technology and Energy Economy</p> <p>Simulation Theory and Applications</p> <p>Statistical Modelling</p> | <p>Energy Technology and Energy Economy</p> <p>Machine Learning and Inductive Interference</p> <p>Statistical Modelling</p> |  |  |  |  |  |



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|--|-----------------------|--|--|--|--|--|--|--|--|
|  | Data Mining           |  |  |  |  |  |  |  |  |
|  | Statistical Modelling |  |  |  |  |  |  |  |  |

| Master's degree program Courses under the Industry 4.0 thematic                 |                        |                   |            |  |  |  |           |                        |                   |
|---|------------------------|-------------------|------------|--|--|--|-----------|------------------------|-------------------|
| Kungliga Tekniska högskolan (KTH)   |                        |                   |            |  |  |  |           |                        |                   |
|   | Big data and analytics | Autonomous Robots | Simulation | Horizontal and vertical system integration | The industrial internet of things  | Cybersecurity  | The cloud | Additive manufacturing | Augmented reality |
| <b>KTH<br/>Master of<br/>Electronics and ICT<br/>Engineering<br/>Technology</b> |                        |                   |            |  | Mobile Networks and Services (IK2560) 7.5 credits<br><br><u>Advanced Internetworking II (IK2217) 7.5 credits</u><br><br>Wireless Communication Systems (IK2507) 7.5 credits<br><br>Wireless Transmission Techniques (IK2508) 7.5 credits<br><br>Communication System Design (IK2200) | <u>Internet Security and Privacy (IK2206)</u><br><br>Advanced Internetworking (IK2215) 7.5 credits<br><br>Building Networked Systems Security (EP2520) |           |                        |                   |

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|  |  |  |  |  | <p>Communication System Design (IK2200) 15.0 credits</p> <p>Communication System Design (IK2200) 15.0 credits</p> |  |  |  |   |
| <p><b>KTH</b></p> <p><b>Computer Science</b></p> | <p><u>Artificial Intelligence (DD2380)</u><br/>6.0 credits</p> <p>Machine Learning (DD2421)<br/>7.5 credits</p> <p>Deep Learning in Data Science (DD2424)<br/>7.5 credits</p> <p>Artificial Neural Networks and Deep Architectures</p> | <p>Introduction to Robotics (DD2410)</p> |  |  | <p>Dependable Autonomous Systems (DD2528)</p>   | <p><u>Computer Security (DD2395)</u> 6.0 credits</p> <p>Software Safety and Security (DD2460)</p> <p>Building Networked Systems Security (EP2520)</p> <p><u>Security Analysis of Large-Scale Computer Systems (EP2790)</u></p> <p>Hardware Security (IL1333)</p> <p><u>Software Safety and Security (DD2460)</u></p> <p>Advanced Networked Systems Security (EP2510)</p> | <p><u>Automated Software Testing and DevOps (DD2482)</u></p> |  | <p>Information Visualization (DH2321)</p> <p>Computer Graphics and Interaction (DH2323)</p> <p>Advanced Graphics and Interaction (DH2413)</p> <p>Computer Game Design (DH2650)</p> <p>Computer Game Design (DH2650)</p> <p>Human Perception for Information Technology (DM2350)</p> <p>Computational Photography</p> <p><u>Applied GPU Programming (DD2360)</u></p> |

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|                                 |  |   |  |  |  | Ethical Hacking (EN2720)  |   |  |  |
| Teaching methods                |  |   |  |  |  |   |   |  |  |
| <b>KTH<br/>Embedded Systems</b> |  | <p>Embedded Systems (IL2206)</p> <p><u>Electronic Systems Design (IL2237)</u></p> <p><u>Embedded Hardware Design in ASIC and FPGA (IL2225)</u></p> <p>Digital Design and Validation using Hardware Description Languages (IL2203)</p> <p>Hands-On Microelectromechanical Systems Engineering (EK2360)</p> <p>Project Course in Robotics and Autonomous Systems (DD2419)</p> |  | <p>Product Realization Processes I (II2300) 7.5 credits</p>  | <p>Sensor Based Systems (II2302)</p> <p>Fundamentals of Integrated Electronics (IL2238)</p> <p>RFID Systems (IS2500)</p> <p>Distributed Systems, Basic Course (ID2201)</p> | <p>Advanced Networked Systems Security (EP2510) 7.5 credits</p> |   |  |  |
| <b>KTH<br/>ICT INNOVATIONS</b>  | <p><u>Analysis and Search of Visual Data (EQ2425)</u></p> <p><u>Data Mining (ID2222)</u></p> | <p>Introduction to Robotics (DD2410)</p>  | <p>Modelling of Dynamical Systems (EL2820)</p> | <p>Technology-based Entrepreneurship (ME2062)</p> <p>e-Business Strategies (ME2095)</p> <p><u>Entrepreneurship for</u></p> | <p>Hybrid and Embedded Control Systems (EL2450)</p> <p>Control Theory and Practice, Advanced Course (EL2520)</p>   | <p><u>Networked Systems Security (EP2500)</u></p>               | <p>Advanced Internetworking (IK2215)</p> <p>Management of Networks and Networked Systems (EP2300)</p> |  | <p>Interaction Design Methods (DH2628)</p> <p>Human-Computer Interaction, Research Seminars (DH2632)</p> <p>Interaction Programming and the Dynamic Web (DH2642)</p> |

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|  |  |  |  | <u>Engineers (ME2072)</u><br><br>Business Development Lab of Entrepreneurship Engineers (ME2073)   | <u>Cyber-Physical Networking (EQ2871)</u><br><br>Sensor Based Systems (II2302)<br><br>Wireless Networks (EP2950)<br><br>Ubiquitous Computing (ID2012)<br><br>Mobile Networks and Services (IK2560)                  |  | Network Analytics (EP2420) |  | <u>Haptics, Tactile and Tangible Interaction (DH2670)</u><br><br>Multimodal Interaction and Interfaces (DT2140)<br><br>Developing Mobile Applications (ID2216)<br><br>Image and Video Processing (EQ2330)<br><br><u>Analysis and Search of Visual Data (EQ2425)</u> |
| <b>KTH</b><br><br><b>Information and Network Engineering</b> | Machine Learning, Advanced Course (DD2434)<br><br>Machine Learning and Data Science (EQ2415) |  |  | <u>Theory and Methodology of Science with Applications (Natural and Technological Science) (AK2036)</u><br><br>IT Management with Enterprise Architecture I (EH2770)<br><br>Industrial Management , Basic Course (ME1003)<br><br>The Sustainable Information and Network | Applied Antenna Theory (EI2400)<br><br>Queuing Theory and Teletraffic Systems (EP2200)<br><br>Principles of Wireless Sensor Networks (EP2700)<br><br>Wireless Networks (EP2950)<br><br>Network Programming (ID1212) | Building Networked Systems Security (EP2520) |                            |  | Project in Multimedia Processing and Analysis (EQ2445)  |

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|   |   |  |  | <p>Engineer (EQ2222)</p> <p>Leadership in Cross-Cultural and Industrial Contexts (ME2089)</p>  | <p>Software Defined Networking (SDN) and Network Functions Virtualization (NFV) (IK2220)</p>  |   |  |  |   |
| <p><b>KTH</b></p> <p><b>Information and Network Engineering</b></p> | <p>Machine Learning, Advanced Course (DD2434)</p> <p>Machine Learning and Data Science (EQ2415)</p> |  |  | <p><u>Theory and Methodology of Science with Applications (Natural and Technological Science) (AK2036)</u></p> <p>IT Management with Enterprise Architecture I (EH2770)</p> <p>Industrial Management , Basic Course (ME1003)</p> <p>The Sustainable Information and Network Engineer (EQ2222)</p> <p>Leadership in Cross-Cultural and Industrial</p> | <p>Applied Antenna Theory (EI2400)</p> <p>Queuing Theory and Teletraffic Systems (EP2200)</p> <p>Principles of Wireless Sensor Networks (EP2700)</p> <p>Wireless Networks (EP2950)</p> <p>Network Programming (ID1212)</p> <p>Software Defined Networking (SDN) and Network Functions Virtualization (NFV) (IK2220)</p> | <p>Building Networked Systems Security (EP2520)</p> |  |  | <p>Project in Multimedia Processing and Analysis (EQ2445)</p> |

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|  |  |  |  | Contexts<br>(ME2089) |  |  |  |  |   |
| <b>KTH<br/>Machine Learning</b>                              | <u>Program Integrating Course in Machine Learning (DD2301)</u><br><br>Artificial Intelligence (DD2380)<br><br>Machine Learning (DD2421)<br><br>Machine Learning, Advanced Course (DD2434)<br><br>Deep Learning, Advanced Course (DD2412) | Introduction to Robotics (DD2410)<br><br>Research project in Robotics, Perception and Learning (DD2411)<br><br>Project Course in Robotics and Autonomous Systems (DD2419)<br><br><u>Probabilistic Graphical Models (DD2420)</u><br><br>Artificial Neural Networks and Deep Architectures (DD2437)<br><br>Artificial Intelligence and Multi Agent Systems (DD2438)<br><br>Pattern Recognition and Machine Learning (EQ2341) |  |                      |  | Computer Security (DD2395)   |  |  | Visualization (DD2257)<br><br>Image Analysis and Computer Vision (DD2423)<br><br><u>Deep Learning in Data Science (DD2424)</u><br><br><u>Visualization (DD2257)</u> |
| <b>KTH<br/>Security and Cloud Computing (Joint Erasmus+)</b> | CS-<br><u>E4640</u> Big Data Platforms   |  |  |                      | <u>II2302</u> Sensor Based Systems<br><br>IK2510 Wireless Networks | CS-<br><u>C3130</u> Information Security<br><br>CS-<br><u>E4350</u> Security Engineering | CS-<br><u>E4190</u> Cloud Software and Systems<br><br>EP2300 Management of |  |   |

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|  |   |  |   |   | IK2511<br>Project in<br>Wireless<br>Networks  | CS-<br>E4300 Networ<br>k Security<br><br>CS-<br>E4160 Labora<br>tory Works in<br>Networking<br>and Security<br><br>CS-<br>E4330 Special<br>Course in<br>Information<br>Security | Networks<br>and<br>Networked<br>Systems<br><br>EP2500 Ne<br>tworked<br>Systems<br>Security |  |                                       |
| <b>KTH</b><br><br><b>Software<br/>Engineering of<br/>Distributed<br/>Systems</b> | Distributed<br>Artificial<br>Intelligence<br>and<br>Intelligent<br>Agents |  |   |   | Distributed<br>Systems, Basic<br>Course<br>(ID2201)   |   |  |  | Programming of<br>Interactive Systems |
| <b>KTH</b><br><br>Systems, Control and<br>Robotics                               |   | <u>Introduction to<br/>Robotics (DD2410)</u><br><br>The Sustainable<br>Systems and Control<br>Engineer (EL2220)<br><br>Control Theory and<br>Practice, Advanced<br>Course (EL2520)<br><br>Automatic Control,<br>General Course<br>(EL1010)<br>Automatic Control,<br>Project Course,<br>Smaller Course<br>(EL2425)<br><br>Dynamics and Motion<br>Control (MF2007) | Modelling of<br>Dynamical<br>Systems<br>(EL2820)<br><br><u>Probabilistic<br/>Graphical<br/>Models<br/>(DD2420)</u><br><br>Complex<br>Analysis<br>(SF1691) | Industrial<br>Management<br>, Basic<br>Course<br>(ME1003)<br><br>Business<br>Development<br>and Quality<br>Management<br>(EH2030) | <u>Hybrid and<br/>Embedded<br/>Control<br/>Systems<br/>(EL2450)</u><br><br>Embedded<br>Systems<br>(IL2206)<br><br>Embedded<br>Software<br>(IL2212)<br><br>Sensor Based<br>Systems<br>(II2302) | <u>Building<br/>Networked<br/>Systems<br/>Security<br/>(EP2520)</u>   |  |  |                                       |

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|   |  | <p>Mechatronics basic Course (MF2030)</p> <p>Robust Mechatronics (MF2043)</p> <p>Project Course in Robotics and Autonomous Systems (DD2419)</p> <p>Applied Vehicle Dynamics Control (SD2231)</p> |  |  |  |  |  |  |   |
| <p><b>KTH</b></p> <p>Engineering Design</p> <p><b>School of Industrial Engineering and Management</b></p> |  | <p>Dynamics and Motion Control (MF2007)</p> <p>Automatic Control, General Course (EL1000)</p>  | <p>Modelling of Dynamical Systems (EL2820)</p> |  |  |  |  |  | <p><u>CAD 3D-modelling and Visualization (MF2019)</u></p> |



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| <p><b>KTH</b></p> <p>Industrial Management</p> <p><b>School of Industrial Engineering and Management</b></p> |  |  |  | <p><u>Project Management : Leadership and Control (ME2016)</u></p> <p><u>Operations and Supply Chain Strategy (ME2065)</u></p> <p><u>Strategy and Industrial Marketing (ME2066)</u></p> <p>Industrial Transformation and Technical Changes (ITTEC) (ME2067)</p> <p><u>Perspectives on Industrial Management (ME2501)</u></p> <p><u>Managing Research and Innovation (ME2069)</u></p> <p><u>Change Project in Industrial Management (ME2502)</u></p> |  |  |  |  |  |
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| <b>KTH</b><br><br><u>Production Engineering and Management</u><br><br><b>School of Industrial Engineering and Management</b> |  |  | <u>Modelling and Simulation of Industrial Processes (MG2130)</u> | Production Engineering - Planning and Control (MG2029)<br><br><u>Production Engineering - Project Course (MG2027)</u><br><br>Digital Factories (MG2038) | <u>Advanced Metrology (MG2110)</u> |  |  | <u>CAD and Other IT Tools in Industrial Processes (MG2028)</u><br><br><u>CAD and Other IT Tools in Industrial Processes, Extended Course (MG2128)</u><br><br><u>Advanced Manufacturing Technology, Extended Course (MG2109)</u> |  |
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|  | <b>Master's degree program Courses under the Industry 4.0 thematic<br/> Instituto Politécnico do Porto (IPP)</b> |   |   |  |   |                      |                                |                               |  |
|--|--|---|---|--|---|----------------------|--------------------------------|-------------------------------|--|
|  | <b>Big data and analytics</b>  | <b>Autonomous Robots</b>  | <b>Simulation</b>   | <b>Horizontal and vertical system integration</b>      | <b>The industrial internet of things</b>  | <b>Cybersecurity</b> | <b>The cloud</b>               | <b>Additive manufacturing</b> | <b>Augmented reality</b>   |
| <b>ISEP PORTO SCHOOL OF ENGINEERING</b><br><br><b>Master in Electrical and Computer Engineering - Automation and Systems</b> |  | Mechatronics Laboratory<br><br>Industrial Robotics (optional)<br><br>Autonomous Systems (optional)<br><br>Advanced Control Systems (optional) | Modelling and Control of Dynamic Systems<br><br>Simulation (optional) | Integrated Networks and Services Management (optional) | Advanced Sensors Applications (optional)<br><br>Instrumentation and Field Networks (optional) |                      | Information Systems (optional) |                               | Image Processing (optional)<br><br>Man-Computer Interaction (optional) |

|   |   |                            |                   |   |   |                      |                  |                               |  |
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|   |   | Mobile Robotics (optional) |                   |   |   |                      |                  |                               |  |
| <b>ISEP PORTO SCHOOL OF ENGINEERING</b><br><br><b>Master in Electrical and Computer Engineering - Autonomous Systems</b>            | Artificial Intelligence and Planning (optional) |                            |                   |   | Network Management and Interconnection (optional)                           |                      |                  |                               | Advanced Vision Topics for Robotics (optional) |
|   | <b>Big data and analytics</b>                   | <b>Autonomous Robots</b>   | <b>Simulation</b> | <b>Horizontal and vertical system integration</b>   | <b>The industrial internet of things</b>                                    | <b>Cybersecurity</b> | <b>The cloud</b> | <b>Additive manufacturing</b> | <b>Augmented reality</b>                       |
| <b>ISEP PORTO SCHOOL OF ENGINEERING</b><br><br><b>Master in Electrical and Computer Engineering - Systems and Industry Planning</b> |   |                            |                   | Industrial and Enterprise Communications<br><br>Decision Support Methods<br><br>Production and Operations Management (optional)<br><br>Quality Management (optional)<br><br>Project Management (optional) | Mobile Communications (optional)<br><br>Advanced Control Systems (optional) |                      |                  |                               | Interaction and Multimedia (optional)          |

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|  |                               |                          |                   | <p>Integrated Networks and Services Management (optional)</p> <p>Operational Research (optional)</p> <p>Multi-criteria Decision Support Methods (optional)</p> <p>Forecasting Methods (optional)</p> <p>Production Management (optional)</p> <p>Innovation and Knowledge Management</p> |  |                      |                  |                               |                          |
|  | <b>Big data and analytics</b> | <b>Autonomous Robots</b> | <b>Simulation</b> | <b>Horizontal and vertical system integration</b>   | <b>The industrial internet of things</b> | <b>Cybersecurity</b> | <b>The cloud</b> | <b>Additive manufacturing</b> | <b>Augmented reality</b> |

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| <p><b>ISEP PORTO<br/>SCHOOL OF<br/>ENGINEERING</b></p> <p><b>Master in<br/>Informatics<br/>Engineering -<br/>Computer<br/>Systems</b></p> |  |                                     |                          | <p>Innovation and<br/>Entrepreneurship</p> <p>People and Team<br/>Management<br/>(optional)</p> | <p>Distributed<br/>Systems<br/>Programming</p> <p>Mobile<br/>Systems</p> <p>Data<br/>Warehouse<br/>and Analytical<br/>Processing<br/>(optional)</p> | <p>Computer<br/>Security<br/>Engineering</p> | <p>Software<br/>Development<br/>Organization</p> <p>Enterprise<br/>Information<br/>Systems<br/>(optional)</p> <p>Advanced<br/>Operating<br/>Systems<br/>Concepts<br/>(optional)</p> |  |                                     |
|   | <p><b>Big data and<br/>analytics</b></p> | <p><b>Autonomous<br/>Robots</b></p> | <p><b>Simulation</b></p> | <p><b>Horizontal and<br/>vertical system<br/>integration</b></p>                                | <p><b>The<br/>industrial<br/>internet of<br/>things</b></p>   | <p><b>Cybersecurity</b></p>                  | <p><b>The cloud</b></p>   | <p><b>Additive<br/>manufacturing</b></p> | <p><b>Augmented<br/>reality</b></p> |

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| <p><b>ISEP PORTO<br/>SCHOOL OF<br/>ENGINEERING</b></p> <p><b>Master in<br/>Informatics<br/>Engineering -<br/>Graphics<br/>Systems and<br/>Multimedia</b></p>       |   |                                     |                          |  |   |                             |                         | <p>Interfaces and<br/>Design</p>         | <p>Multimedia<br/>Technologies</p> <p>Multimedia<br/>Applications<br/>Architecture<br/>(optional)</p> <p>Graphical<br/>Systems</p> <p>Serious Games</p> <p>Advanced<br/>Graphical<br/>Applications</p> |
|  | <p><b>Big data and<br/>analytics</b></p>                | <p><b>Autonomous<br/>Robots</b></p> | <p><b>Simulation</b></p> | <p><b>Horizontal and<br/>vertical system<br/>integration</b></p> | <p><b>The<br/>industrial<br/>internet of<br/>things</b></p> | <p><b>Cybersecurity</b></p> | <p><b>The cloud</b></p> | <p><b>Additive<br/>manufacturing</b></p> | <p><b>Augmented<br/>reality</b></p>  |
| <p><b>ISEP PORTO<br/>SCHOOL OF<br/>ENGINEERING</b></p> <p><b>Master in<br/>Informatics<br/>Engineering -<br/>Information<br/>and<br/>Knowledge<br/>Systems</b></p> | <p>Data Warehouse<br/>and Analytical<br/>Processing</p> |                                     |                          |  |   |                             |                         |  |  |

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| <b>ISEP PORTO<br/>SCHOOL OF<br/>ENGINEERING</b><br><br>Master in<br>Mechanical<br>Engineering -<br>Industrial<br>Management | Experimental<br>Statistics and<br>Data Analysis |  |  | Reliability and<br>Maintenance<br>(optional)<br><br>Process<br>Improvement and<br>Optimization<br>Techniques | Quality,<br>Environmental<br>and Health<br>and Safety<br>Management<br>Systems |  | Computer Aided<br>Manufacturing | Virtual<br>Enterprises<br>(optional) |
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