## Elective modules

| Module number | Module name | 1st semester | 2nd semester | 3rd semester | Credits |
|---|---|---|---|---|---|
| | | *Lecture* (Lecturer) (L/E/P) | *Lecture* (Lecturer) (L/E/P) | *Lecture* (Lecturer) (L/E/P) | |
| EuI-NES-E-GLC | **German Language and Culture** | *German Language and Culture* (TUDIAS) (4 language courses) | | | 5 |
| EuI-NES-E-PlaTe | **Plasma Technology** | *Plasma Technology* (Hauff, Hinz) (4/2/0) | | | 7 |
| INF-NES-E-SE1 | **Foundations of Systems Engineering** | *Systems Engineering 1* (Fetzer) (2/2/0) | | | 6 |
| EuI-NES-E-JCAS | **Joint Communications and Sensing Systems for 6G Networks** | *Joint Communications and Sensing Systems for 6G Networks* (Dokhanchi) (2/2/0) | | | 5 |
| EuI-NES-E-StSig | **Stochastic Signals and Systems** | *Stochastic Signals and Systems* (Schaefer) (2/2/0) | | | 6 |
| EuI-NES-E-NNMHA | **Neural Networks and Memristive Hardware Accelerators** | *Neural Networks and Memristive Hardware Accelerators* (Schroedter) (2/0/2, 2 project) | | | 7 |
| EuI-NES-E-LSer | **Requirements and methodologies for design of integrated circuits from industrial production perspective** | | *Requirements and methodologies for design of integrated circuits from industrial production perspective* (Schulz) (4/0/0) | | 5 |
| WIWI-NES-E-ResM | **Resource Management** | | *Ressource Management* (Günther) (2/0/0) 2 project | | 5 |
| PHY-NES-E-NanSc | **Nanoscience** | | *Nanotechnology* (Eng) (2/0/0)<br>*Scanning Probe Microscopy* (Eng) (2/0/0) | | 6 |
| MW-NES-E-NSM | **Nanostructured Materials** | | *Nanostructured Materials* (Cuniberti) (2/2/2) | | 7 |
| NES-E-AdLsy | **Adaptive Laser Systems** | | *Laser Metrology and Quantum Technology* (Czarske) (2/1/0)<br>*Laser Sensor Technology Lab* (Czarske) (0/0/1) | | 5 |
| EuI-NES-E-ARS | **Antennas and Radar Systems** | | *Antennas and Radar Systems* (Plettemeier) (4/2/0) | | 7 |
| EuI-NES-E-AJCAS | **Applied Joint Communications and Sensing Systems** | | *Applied Joint Communications and Sensing Systems* (Dokhanchi) (2/2/0) | | 5 |
| EuI-NES-E-Comms | **Communications** | | *Communications* (Fettweis) (2/11) | | 5 |
| INF-NES-E-SFT | **Foundations of Software-Fault Tolerance** | | *Software Fault Tolerance* (Fetzer) (2/20) | | 6 |
| INF-NES-E-WSN | **Wireless Sensor Networks** | | *Wireless Sensor Networks* (Dargie) (2/20) | | 6 |
| INF-NES-E-ACSR | **Adaptive Computing Systems for Robotics** | | *Adaptive Computing Systems for Robotics* (Göhringer) (2/2/0) | | 6 |
| EuI-NES-E-DNNH | **Deep Neural Network Hardware** | | *Deep Neural Network Hardware* (Mayr) (2/2/0) | | 5 |
| INF-NES-E-EMA | **Design and Programming of Embedded Multicore Architectures** | | *Design and Programming of Embedded Multicore Architectures* (Göhringer) (2/2/0) | | 6 |
| EuI-NES-E-ONC | **Introduction to Optical Nonclassical Computing: Concepts and Devices** | | *Introduction to Optical Nonclassical Computing: Concepts and Devices* (Jamshidi) (4/2/0) | | 7 |
| EuI-NES-E-NVLSI | **Neuromorphic VLSI Systems** | | *Neuromorphic VLSI Systems* (Mayr) (4/2/0) | | 7 |
| EuI-NES-E-PD | **Physical Design** | | *Physical Design* (Fettweis/ Sen/ Haas) (2/0/1) | | 6 |
| EuI-NES-E-VLSI | **VLSI Processor Design** | | *VLSI Processor Design* (Mayr) (2/2/2) | | 7 |
| EuI-NES-E-3DSI | **Materials for the 3D System Integration** | | *3D System Integration and 3D Technologies* (Panchenko) (2/0/0) | *Micro-/Nanomaterials and Reliability Aspects* (Panchenko) (2/0/1, one day excursion) | 7 |
| EuI-NES-E-MemTe | **Memory Technology** | | *Memory Technology 1* (Mikolajick) (2/0/0, 1 seminar) | *Memory Technology 2* (Mikolajick) (2/0/0, 1 seminar) | 7 |
| PHY-NES-E-NanOp | **Nano&Optics** | | *NanoOptics* (Eng) (2/0/0) | *Modern Optics* (Reineke) (2/0/0) | 6 |
| EuI-NES-E-ICAND | **Innovative Concepts for Active Nanoelectronic Devices** | | | *Materials for Nanotechnology* (Richter) (2/0/1)<br>*Innovative Semiconductor Devices* (Mikolajick) (2/1/0) | 7 |
| MW-NES-E-MoEl | **Molecular Electronics** | | | *Molecular Electronics* (Cuniberti/Moresco) (2/2/0) | 5 |
| EuI-NES-E-OPTO | **Optoelectronic Devices and Systems** | | | *Optoelectronic Devices and Systems* (Lakner) (2/1/1) | 5 |
| PHY-NES-E-QMNE | **Quantum Mechanics for Nanoelectronics** | | | *Semiconductor Quantum Structures* (Helm) (2/0/0)<br>*Quantum and solid state physics* (Scholz) (3/1/0) | 7 |
| NES-12 10 20 | **Communication Networks 3** | | | *Communication Networks 3* (Fitzek) (3/0/0/0/0)<br>*CN-Actual Topics-Problem based learning* (Fitzek) (1/2/0/0/0) | 7 |

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|---|---|---|---|---|---|
| EuI-NES-E-ComLS | **Computational Laser Systems** | | | *Digital Holography and Image Processing*<br>(Czarske) (1/1/0)<br><br>*Biomedical Laser Systems and Optogenetics*<br>(Czarske) (2/0/0) | 5 |
| EuI-NES-E-FED | **Fundamentals of Estimation and Detection** | | | *Fundamentals of Estimation and Detection*<br>(Fettweis) (2/2/0) | 6 |
| EuI-NES-E-FCN | **Future Communication Networks** | | | *Communication Networks 3*<br>(Fitzek) (3/0/0)<br><br>*CN-Actual Topics-Problem based learning*<br>(Fitzek) (1/2/0) | 7 |
| EuI-NES-E-HJCAS | **Joint Communication and Sensing RF Hardware** | | | *Joint Communication and Sensing RF Hardware*<br>(Fettweis/ Sen) (2/0/0, 1 tutorial) | 5 |
| NES-11 06 07-14.1 | **Ubiquitous Systems** | | | *Distributed Systems*<br>(Springer) (2/2/0/0/0)<br><br>*Mobile Communication and mobile computing*<br>(Dargie/ Wählisch) (2/0/0/0/0) | 7 |
| EuI-NES-E-EMNet | **Electromechanical Networks** | | | *Electromechanical Networks*<br>(Marschner) (2/1/1) | 5 |
| EuI-NES-E-FCPL | **Foundations of Certified Programming Language and Compiler Design** | | | *Foundations of Certified Programming Language and Compiler Design*<br>(Ertel) (2/2/0) | 6 |
| INF-NES-E-HMS | **Hardware Modelling and Simulation** | | | *Hardware Modelling and Simulation*<br>(Göhringer) (2/2/0) | 6 |
| EuI-NES-E-ICBC | **Integrated Circuits for Broadband Optical Communications** | | | *Integrated Circuits for Broadband Optical Communications*<br>(Ellinger) (3/1/2) | 7 |
| EuI-NES-E-IPD | **Integrated Photonic Devices for Communications and Signal Processing** | | | *Integrated Photonic Devices for Communications and Signal Processing*<br>(Jamshidi) (4/0/2) | 7 |

**Last updated: 20th August, 2024**

L Lecture in hours per week (2 = 90 minutes)
E Exercise in hours per week (2 = 90 minutes)
P Practical lab course in hours per week (2 = 90 minutes)

**Key areas:**

Technology
Design
Applications