



Subject card

| | | | | | | | |
|---|--|--|----------|-------------------------------------|---|------------|-----|
| Subject name and code | Microelectronic Embedded Systems, PG_00064071 | | | | | | |
| Field of study | Electronics and Telecommunications | | | | | | |
| Date of commencement of studies | February 2027 | Academic year of realisation of subject | | | 2027/2028 | | |
| Education level | second-cycle studies | Subject group | | | Optional subject group Specialty subject group Subject group related to scientific research in the field of study | | |
| Mode of study | Full-time studies | Mode of delivery | | | at the university | | |
| Year of study | 1 | Language of instruction | | | Polish | | |
| Semester of study | 2 | ECTS credits | | | 3.0 | | |
| Learning profile | general academic profile | Assessment form | | | exam | | |
| Conducting unit | Department of Microelectronic Systems -> Faculty of Electronics Telecommunications and Informatics -> Faculties of Gdańsk University of Technology | | | | | | |
| Name and surname of lecturer (lecturers) | Subject supervisor | dr hab. inż. Marek Wójcikowski | | | | | |
| | Teachers | dr hab. inż. Marek Wójcikowski | | | | | |
| Lesson types | Lesson type | Lecture | Tutorial | Laboratory | Project | Seminar | SUM |
| | Number of study hours | 15.0 | 0.0 | 15.0 | 15.0 | 0.0 | 45 |
| | E-learning hours included: 0.0 | | | | | | |
| Learning activity and number of study hours | Learning activity | Participation in didactic classes included in study plan | | Participation in consultation hours | | Self-study | SUM |
| | Number of study hours | 45 | | 6.0 | | 24.0 | 75 |
| Subject objectives | To become acquainted with the structure and capabilities of microelectronic embedded systems. | | | | | | |

| Learning outcomes | Course outcome | Subject outcome | Method of verification |
|-------------------|--|---|---------------------------------------|
| | [K7_W03] knows and understands, to an increased extent, the construction and operating principles of components and systems related to the field of study, including theories, methods and complex relationships between them and selected specific issues - appropriate for the curriculum | knows the structure and operation of selected real-time operating systems | [SW1] Assessment of factual knowledge |
| | [K7_U04] can apply knowledge of programming methods and techniques as well as select and apply appropriate programming methods and tools in computer software development or programming devices or controllers using microprocessors or programmable elements or systems specific to the field of study, making assessment and critical analysis of the prepared software as well as a synthesis and creative interpretation of information presented with it | configures the real-time operating system in designed embedded systems | [SU1] Assessment of task fulfilment |
| | [K7_U03] can design, according to required specifications, and make a complex device, facility, system or carry out a process, specific to the field of study, using suitable methods, techniques, tools and materials, following engineering standards and norms, applying technologies specific to the field of study and experience gained in the professional engineering environment | designs and runs embedded systems based on programmable systems, | [SU1] Assessment of task fulfilment |
| | [K7_W04] knows and understands, to an increased extent, the principles, methods and techniques of programming and the principles of computer software development or programming devices or controllers using microprocessors or other elements or programmable devices specific to the field of study, and organization of work of systems using computers or such devices | knows the structure, properties and applications of embedded systems; | [SW1] Assessment of factual knowledge |

Subject contents

Course content – lecture

- 1 Embedded systems definitions.
- 2 Embedded systems internals hardware.
- 3 Microprocessors and microcontrollers in embedded systems.
- 4 FPGAs in embedded systems.
- 5 Memories in embedded systems.
- 6 Buses in embedded systems.
- 7 Input/output circuits in embedded systems.
- 8 Analog circuits in embedded systems.
- 9 Embedded systems diagnostics.
- 11 Embedded systems internals software.
- 12 Programming languages for embedded systems.
- 13 Operating systems used for embedded systems.
- 14 Linux as an operating system for embedded systems.
- 15 Linux kernel configuration.
- 16 Linux system bootloaders.
- 17 Linux device drivers.
- 18 File systems in Linux.
- 19 Tools and methods for embedded Linux configuration.
- 20 Programmer's tools for embedded Linux.
- 21 Linux as a real-time operating system.
- 22 Description of some commercial real-time operating systems.
- 23 Compiler configuration.
- 24 Linker configuration.
- 25 Compilation process automation.
- 26 Wishbone bus.

| | <p>27 System on Chip technology.</p> <p>29 Network on Chip technology.</p> <p>30 Importance of power consumption reduction in embedded systems.</p> <p>31 Hardware power consumption reduction methods.</p> <p>32 Software power consumption reduction methods.</p> <p>33 Reliability of embedded systems.</p> | | | | | | | | | | | | |
|---|---|--------------------------|---|-------------------------------|------------------|----------------------|-------|------------|-------|-------|-------------|-------|-------|
| Prerequisites and co-requisites | Knowledge of VHDL (or Verilog) and C/C++ language. Recommended knowledge of Microelectronic Programmable Systems. | | | | | | | | | | | | |
| Assessment methods and criteria | <table border="1"> <thead> <tr> <th>Subject passing criteria</th> <th>Passing threshold</th> <th>Percentage of the final grade</th> </tr> </thead> <tbody> <tr> <td>Seminar</td> <td>50.0%</td> <td>20.0%</td> </tr> <tr> <td>Laboratory</td> <td>50.0%</td> <td>40.0%</td> </tr> <tr> <td>Examination</td> <td>50.0%</td> <td>40.0%</td> </tr> </tbody> </table> | Subject passing criteria | Passing threshold | Percentage of the final grade | Seminar | 50.0% | 20.0% | Laboratory | 50.0% | 40.0% | Examination | 50.0% | 40.0% |
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| Recommended reading | <table border="1"> <tr> <td>Basic literature</td> <td> <p>T. Noergard, Embedded Systems Architecture, Elsevier 2005</p> <p>J. Ganssle, The Art of Designing Embedded Systems, Elsevier, 2008.</p> <p>Xilinx, www.xilinx.com</p> <p>J. Catsoulis, Designing Embedded Hardware, OReilly Media, 2005.</p> </td> </tr> <tr> <td>Supplementary literature</td> <td>No requirements.</td> </tr> <tr> <td>eResources addresses</td> <td></td> </tr> </table> | Basic literature | <p>T. Noergard, Embedded Systems Architecture, Elsevier 2005</p> <p>J. Ganssle, The Art of Designing Embedded Systems, Elsevier, 2008.</p> <p>Xilinx, www.xilinx.com</p> <p>J. Catsoulis, Designing Embedded Hardware, OReilly Media, 2005.</p> | Supplementary literature | No requirements. | eResources addresses | | | | | | | |
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| Example issues/ example questions/ tasks being completed | | | | | | | | | | | | | |
| Practical activities within the subject | Not applicable | | | | | | | | | | | | |

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