COURSE DESCRIPTION

1. **Course title:** COMPUTER SYSTEMS INTERFACES

2. **Course code:** CSI

3. **Validity of course description:** 2015/2016

4. **Level of studies:** BSc programme

5. **Mode of studies:** intramural studies

6. **Field of study:** INFORMATICS

7. **Profile of studies:** COMPUTER SCIENCE

8. **Programme:**

9. **Semester:** 5,6

10. **Faculty teaching the course:** Institute of Informatics, RAu2

11. **Course instructor:** dr inż. Wojciech Mielczarek

12. **Course classification:**

13. **Course status:** required

14. **Language of instruction:** English

15. **Pre-requisite qualifications:** circuit theory, operating systems, embedded systems, programming in C

16. **Course objectives:**

   The course presents evolution of computer interfaces as new types of peripherals were introduced. The first part explains legacy interfaces like UART and parallel port, the second contemporary “system ports”: USB, IEEE 1394 (FireWire), Bluetooth and BLE. IEEE-488 (GPIB) interface and SCPI language are also covered, as well as problems connected with data acquisition. The special topic included is system protection against noises.

   The course gives students familiarity with the following topics:

   - standard and specialised computer systems interfaces used for communication with the peripheral devices,
   - software aspects of communication with peripherals,
   - selected examples of peripherals,
   - good practices of communicating with peripheral equipment (including protection against noise).

17. **Description of learning outcomes:**

<table>
<thead>
<tr>
<th>Nb.</th>
<th>Learning outcomes description</th>
<th>Method of assessment</th>
<th>Teaching methods</th>
<th>Learning outcomes reference code</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Understanding fundamentals of communication in a computer system</td>
<td>Final test</td>
<td>Lecture</td>
<td>K1A_W12</td>
</tr>
<tr>
<td>2.</td>
<td>Knowledge on RS-232, RS-422, RS-485 ports. Knowledge on USB, FireWire, Bluetooth and BLE architecture.</td>
<td>Final test</td>
<td>Lecture</td>
<td>K1A_W08;K1A_W12</td>
</tr>
<tr>
<td>3.</td>
<td>Knowledge on IEEE-488 bus and controlling of SCPI compatible devices</td>
<td>Final test</td>
<td>Lecture</td>
<td>K1A_W06</td>
</tr>
<tr>
<td>4.</td>
<td>Skills for setting the com port parameters, controlling transmission on com port, managing communication on MODBUS.</td>
<td>Laboratory exercise</td>
<td>Laboratory, project</td>
<td>K1A_U13;K1A_U29</td>
</tr>
<tr>
<td>5.</td>
<td>Understanding, configuring, and managing communication on system ports like USB, IEEE-1394a, Bluetooth</td>
<td>Laboratory exercise</td>
<td>Laboratory</td>
<td>K1A_U05;K1A_U21; K1A_U30;K1A_U31</td>
</tr>
<tr>
<td>6.</td>
<td>Skills for controlling peripheral devices compatible with SCPI standard</td>
<td>Laboratory exercise</td>
<td>Laboratory</td>
<td>K1A_U21;K1A_U31</td>
</tr>
</tbody>
</table>

18. **Teaching modes and hours**

   - Lecture: 30 h
   - Laboratory: 15 h

19. **Syllabus description:**

   - **Lectures:**
     - Interfaces in the legacy computer systems: RS-232 and SPP (EPP, ECP).
     - Serial port expansion: RS-423A, RS-422A, RS-485 interfaces
− Fieldbuses based on serial, asynchronous transmission and RS-232 switches or RS-485 bus.
− USB system architecture, (USB 2.0, USB 3.1 Gen1.)
− IEEE 1394a (FireWire) system architecture.
− Bluetooth and Bluetooth Low Energy architecture.
− IEEE-488 (GPIB) interface; controlling the instruments in SCPI language.
− Protection of data transmission circuits against noises.

Labs:
− RS-232 serial port; the fieldbus based on RS-485 and MODBUS protocol; controlling the communication system based on multiports RS-232 switches
− USB 2.0 – Universal Serial Bus
− USB 3.1 device embedded software, USB 3.1 Gen1 driver in Linux
− FireWire (IEEE1394a) – managing and communication
− Wireless Bluetooth and BLE systems
− (IEEE-488 (GPIB) interface; controlling the SCPI instruments

20. Examination: none

21. Primary sources:

22. Secondary sources:
   W. Mielczarek: Szeregowe interfejsy cyfrowe, Helion 1993
   W. Mielczarek: USB – Uniwersalny interfejs szeregowy, Helion 2006
   W. Mielczarek: Szeregowy interfejs cyfrowy FireWire, Standardy IEEE 1394, IEEE 1394a, Wydawnictwo Politechniki Śląskiej, Gliwice 2010
   W. Mielczarek: Tłumienie zakłóceń i ochrona informacji w systemach pomiarowych, Wydawnictwo Politechniki Śląskiej, skrypt nr 1921, Gliwice 1995
   W. Mielczarek: Urządzenia pomiarowe i systemy kompatybilne ze standardem SCPI, Helion 1999
   W. Mielczarek: Komputerowe systemy pomiarowe, Standardy IEEE-488.2 i SCPI, Wydawnictwo Politechniki Śląskiej, Gliwice 2002
   D.Caban, W.Mielczarek, R.Pawlowski: Komputerowe systemy pomiarowe, ćwiczenia laboratoryjne, Wydawnictwo Politechniki Śląskiej, Gliwice 2004

23. Total workload required to achieve learning outcomes

<table>
<thead>
<tr>
<th>Lp.</th>
<th>Teaching mode :</th>
<th>Contact hours / Student workload hours</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Lecture</td>
<td>30/15</td>
</tr>
<tr>
<td>2</td>
<td>Classes</td>
<td>15/15</td>
</tr>
<tr>
<td>3</td>
<td>Laboratory</td>
<td>/</td>
</tr>
<tr>
<td>4</td>
<td>Project</td>
<td>/</td>
</tr>
<tr>
<td>5</td>
<td>BA/ MA Seminar</td>
<td>/</td>
</tr>
<tr>
<td>6</td>
<td>Other</td>
<td>/</td>
</tr>
<tr>
<td></td>
<td>Total number of hours</td>
<td>45/30</td>
</tr>
</tbody>
</table>

24. Total hours: 75

25. Number of ECTS credits: 2

26. Number of ECTS credits allocated for contact hours: 1

27. Number of ECTS credits allocated for in-practice hours (laboratory classes, projects): 1

28. Comments:

Approved:

(date, Instructor’s signature)  (date, the Director of the Faculty Unit signature)