

SYLLABUS

Name: Measurement data acquisition applications designing (TIAu>SM2-MDAAD19)

Name in Polish:

Name in English: Measurement data acquisition applications designing

Information on course:

Course offered by department: Faculty of Automatic Control, Electronics and Computer Science

Course for department: Silesian University of Technology

Default type of course examination report:

ZAL

Language:

English

Course homepage:

<https://platforma2.polsl.pl/rau2/course/view.php?id=860>

Short description:

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The course gives students familiarity with the Data Acquisition Systems (DAS), Automatic Test Equipment (ATE), noise problem in Digital Measurement Systems (DMS), communication ports used in DMS, Standard Commands for Programmable Instruments (SCPI) control language, programming environments to create applications oriented for measurement data acquisition.

Description:

ECTS: 3

Total workload: 75 (45 contact hours / 30 student's own work hours)

Lecture: 15h

Laboratory: 30h

Student's own work: preparation for classes, preparation for laboratory work, compilation of documentation from laboratory classes

Description:

Some issues are discussed in more detailed:

- Converting analog measurement signals into digital form (scaling, filtering, multiplexing, A/D converting),
- Data acquisition systems (DAS): elements, configurations, features,
- Transmitting measurement signals to computer: through standard serial ports (RS-232, USB, Bluetooth) and specialized ports (IEEE-488.2 - GPIB),
- Measurement instrumentation control languages (SCPI – Standard Commands for Programmable Instruments)
- Environments like Agilent (Keysight) VEE and LabView for creating data acquisition applications

The course is supplemented with laboratory exercises:

1. SCPI Language for Programmable Instruments Control, part 1
2. SCPI Language for Programmable Instruments Control, part 2
3. Designing Measurement System Application using Keysight VEE
4. Designing Measurement System Application using OpenSource tools
5. Communication with measurement devices through serial interface
6. DAQ cards

Bibliography:

Bibliography:

Recommended reading in english:

1. Analog to Digital Converters Handbook, Analog Devices 1991
2. Morrison R.: Grounding and Shielding Techniques in Instrumentation, Wiley, New York 1967
3. Jan Axelson: USB Complete, Everything You Need to Develop Custom USB Peripherals, Second Edition, Lakeview Research, Madison, WI53704, 2001, ISBN 0-9650819-5-8
4. Bray J., Sturman Ch.: Bluetooth 1.1 Connect Without Cables, 2nd ed., Prentice Hall PTR 2002

Recommended reading in polish:

1. Mielczarek W.: Szeregowe interfejsy cyfrowe, Helion 1993
2. Mielczarek W.: USB – Uniwersalny interfejs szeregowy, Helion 2006
4. Mielczarek W.: Architektura interfejsu Bluetooth, Wydawnictwo Politechniki Śląskiej 2020
5. Mielczarek W.: Tłumienie zakłóceń i ochrona informacji w systemach pomiarowych, Wydawnictwo Politechniki Śląskiej, skrypt nr 1921, Gliwice 1995
6. Mielczarek W.: Urządzenia pomiarowe i systemy kompatybilne ze standardem SCPI, Helion 1999
7. Mielczarek W.: Komputerowe systemy pomiarowe, Standardy IEEE-488.2 i SCPI, Wydawnictwo Politechniki Śląskiej, Gliwice 2002
8. D.Caban, W.Mielczarek, R.Pawłowski: Komputerowe systemy pomiarowe, ćwiczenia laboratoryjne, Wydawnictwo Politechniki Śląskiej, Gliwice 2004
9. Znamirowski L.(red.), E.Korbiel, W.Mielczarek, R.Maceluch, M.Skrzewski: Wprowadzanie i wyprowadzanie informacji w systemach cyfrowych, Skrypt Uczelniany Politechniki Śląskiej nr 1167, Gliwice 1984

Learning outcomes:

Learning outcomes:

K2A_W04

Student knows and understands the architecture of data acquisition systems and the basics of computer interfaces.

K2A_U22

Student is able to design and build measurement and control systems and create data acquisition oriented applications in graphical environments.

Assessment methods and assessment criteria:

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USOS: Szczegóły przedmiotu: TIAu>SM2-MDAAD19, w cyklu: <brak>, jednostka dawcy: <brak>, grupa przedm.: <brak>

Assessment of the student's preparation for laboratory classes.

Assessment of the student's activity in class, his ability to solve problems and carry out tasks in the class.

Assessment of the documentation prepared during the class (protocol and reports).

Individual final assessment of the exercise takes into account all the above-mentioned elements. The final grade is the average of the grades obtained in individual exercises. It is required to be present at all exercises and pass every exercise.

Syllabus is valid from academic year 2024/2025, and its content cannot be changed during semester.

Course credits in various terms:

<without a specific program>			
Type of credits	Number	First term	Last term
European Credit Transfer System (ECTS)	3	2020/2021-Z	