Transilvania University of Brașov
INTERDISCIPLINARY DOCTORAL SCHOOL

ADMISSION TO DOCTORAL STUDIES **Session September 2025**

Field of doctoral studies: Electronics engineering, telecommunications, and information technologies

Doctoral supervisor: Prof. Dr. Petru A. COTFAS

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: *Embedded systems applied in the characterization of renewable energy sources in concentrated light*
Contents / Main aspects to be considered Embedded systems and technologies, IoT type, applied in concentrated light systems. Intelligent systems for the characterization and monitoring of renewable energy sources. Artificial intelligence and machine learning applied in data processing for the characterization of renewable energy sources.
Recommended bibliography: [1] Bernardo Yaser León Ávila, Carlos Alberto García Vázquez, Osmel Pérez Baluja, Daniel Tudor Cotfas, Petru Adrian Cotfas, Energy harvesting techniques for wireless sensor networks: A systematic literature review, Energy Strategy Reviews,Vol. 57, 2025, https://doi.org/10.1016/j.esr.2024.101617. [2] T. Ahmad and M. Rihan, "Virtual instrumentation based Wireless Sensor Networks in smart grid scenario," 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom), New Delhi, India, 2016, pp. 1243-1248. [3] M. Junus, S. Wirayoga and S. Amartya Putri, "Wireless Sensor Network for Energy Monitoring Based on Hybrid Power Plants AH Buildings," *2022 International Conference on Electrical and Information Technology (IEIT)*, Malang, Indonesia, 2022, pp. 160-164, doi: 10.1109/IEIT56384.2022.9967876. [4] Fahmy, H. M. A. (2020). Wireless Sensor Networks: Energy Harvesting and Management for Research and Industry. Germany: Springer International Publishing. [5] Petru Adrian Cotfas, Daniel Tudor Cotfas, and Horia Hedesiu. Virtual Instrumentation Used in Renewable Energy. IntechOpen: LabVIEW - Virtual Instrumentation in Education and Industry. 12 June, 2024. doi: https://doi.org/10.5772/intechopen.102279 [6] Tze-Zhang Ang, Mohamed Salem, Mohamad Kamarol, Himadry Shekhar Das, Mohammad Alhuyi Nazari and Natarajan Prabaharan. A Comprehensive Study of Renewable Energy Sources: Classifications, Challenges and Suggestions. 27 September 2022. Doi: https://doi.org/10.1016/j.esr.2022.100939.
Prerequisites / Remarks: Knowledge of renewable energies, applied electronics in the characterization of renewable energy sources and virtual instrumentation
☒ **Scientific Doctorate (full-time only)** ☐ **Professional Doctorate (full-time or part-time)**

☒ **without tuition fee (state budget funded)**

☐ **with tuition fee or with funding from other sources than the state budget**

TOPIC 2: *Wireless Sensor Networks for Renewable Energy Systems Based on Virtual Instrumentation*

Contents / Main aspects to be considered

Wireless sensor networks (WSN) used in the field of renewable energies - concepts and solutions.

Energy recovery solutions using renewable energy sources for WSN.

Monitoring of renewable energy systems using WSN.

Analysis using methods based on artificial intelligence of data obtained through monitoring for preventive detection of possible faults in the electrical network.

Recommended bibliography:

[1] Bernardo Yaser León Ávila, Carlos Alberto García Vázquez, Osmel Pérez Baluja, Daniel Tudor Cotfas, Petru Adrian Cotfas, Energy harvesting techniques for wireless sensor networks: A systematic literature review, Energy Strategy Reviews,Vol. 57, 2025, https://doi.org/10.1016/j.esr.2024.101617.

[2] T. Ahmad and M. Rihan, "Virtual instrumentation based Wireless Sensor Networks in smart grid scenario," 2016 3rd International Conference on Computing for Sustainable Global Development (INDIACom), New Delhi, India, 2016, pp. 1243-1248.

[3] M. Junus, S. Wirayoga and S. Amartya Putri, "Wireless Sensor Network for Energy Monitoring Based on Hybrid Power Plants AH Buildings," *2022 International Conference on Electrical and Information Technology (IEIT)*, Malang, Indonesia, 2022, pp. 160-164, doi: 10.1109/IEIT56384.2022.9967876.

[4] Fahmy, H. M. A. (2020). Wireless Sensor Networks: Energy Harvesting and Management for Research and Industry. Germany: Springer International Publishing.

[5] Petru Adrian Cotfas, Daniel Tudor Cotfas, and Horia Hedesiu. Virtual Instrumentation Used in Renewable Energy. IntechOpen: LabVIEW - Virtual Instrumentation in Education and Industry. 12 June, 2024. doi: https://doi.org/10.5772/intechopen.102279

[6] Tze-Zhang Ang, Mohamed Salem, Mohamad Kamarol, Himadry Shekhar Das, Mohammad Alhuyi Nazari and Natarajan Prabaharan. A Comprehensive Study of Renewable Energy Sources: Classifications, Challenges and Suggestions. 27 September 2022. Doi: https://doi.org/10.1016/j.esr.2022.100939.

Prerequisites / Remarks: *to be adapted/ completed/ deleted*

Knowledge of wireless sensor networks, renewable energy sources, wireless communication protocols and virtual instrumentation.

☒ **Scientific Doctorate (full-time only)**

☐ **Professional Doctorate (full-time or part-time)**

☒ **without tuition fee (state budget funded)**

☐ **with tuition fee or with funding from other sources than the state budget**

Doctoral supervisor,

Prof. dr. Petru A. COTFAS

Signature

Coordinator of the field of doctoral studies,

Prof. dr. Eng. Mihai IVANOVICI

Signature