Transilvania University of Brașov
INTERDISCIPLINARY DOCTORAL SCHOOL

ADMISSION TO DOCTORAL STUDIES **Session September 2026**

Field of doctoral studies: Electrical Engineering
Doctoral supervisor: Prof. PhD. Eng. Paul Nicolae BORZA

TOPICS FOR THE ADMISSION TO DOCTORAL STUDIES

TOPIC 1: Holistic developments regarding electric vehicle fleet management

Contents / Main aspects to be considered:

- Analysis of the context of current developments related to electro-mobility: specific features, requirements, constraints and methods that allow optimizing the energy efficiency in the operation of vehicle fleets.
- Conceptual development of models for electric vehicles and new generations of connected vehicles
- Development of an integrated environment for monitoring and optimizing the operation of connected electric vehicles by introducing monitoring, assistance and control services for them
- Analysis of the consequences that these developments have on energy and operation efficiency, maintenance and reliability
- Sustainability of development

Recommended bibliography:

[1]. Daniel, A et al. Digital Twin Technology and Applications, Auerbach Publications, 2024. Web. 21 May 2026.
[2]. Farsi, Maryam, et al., editors. Digital Twin Technologies and Smart Cities. Springer, 2020. SpringerLink, https://doi.org/10.1007/978-3-030-18732-3.
[3]. K. Jin, X. Li, W. Wang, X. Hua, and W. Long, "Energy-optimal speed control for connected electric buses considering passenger load," *Journal of Cleaner Production*, vol. 385, Jan. 2023, doi: https://10.1016/j.jclepro.2022.135773

Prerequisites / Remarks:

◘ 5-year bachelor's degree or 3-4-year bachelor's degree followed by a master's degree in fields such as electrical, electronic and telecommunications engineering, computer science or mathematics
◘ Knowledge of physics, mathematics
◘ Knowledge of computer programming
◘ Good knowledge of English and possibly other international languages

X Scientific Doctorate

X Professional Doctorate
X without tuition fee (state budget funded) **X with tuition fee or with funding from other sources than the state budget**

TOPIC 2: Development of stationary and mobile applications equipped with hybrid electrical energy storage systems (supercapacitors, batteries, fuel cells)
Contents / Main aspects to be considered • Low- and medium-voltage electrical networks incorporating elements such as renewable energy sources, prosumers, and electrical energy storage systems; • Cells, devices, and systems for electrical energy storage (operating principles of devices, sizing, interconnection, control, and integration); • Modeling, simulation, and experimental testing of applications equipped with hybrid electrical energy storage systems;   • Experimental validation of the applications under study.
Recommended bibliography: [1]. Conway B.E., Electrochemical Supercapacitors: Scientific Fundamentals and Technological Applications, Springer Sciences + BusinessMedia New York, 1999, 001: 10.1007/978-1- 4757-3058-6 [2]. Balabanian, N., Bickart, T.A. (1969) Electrical Network Theory. John Wiley & Sons, New York, ISBN : 0471045764 [3]. Borza P.N., 1Vl . Machedon-Plsu, 1Vl .C.Carp, Hybrid electrical storage solutions rut developing reliable transport systems, 14th International Renewable Energy Storage Conference 2020 (IRES 2020), Atlantis Press, part of Springer Nature 2021 .
Prerequisites / Remarks: ◘ 5-year bachelor's degree or 3-4-year bachelor's degree followed by a master's degree in fields such as electrical, electronic and telecommunications engineering, computer science or mathematics ◘ Knowledge of physics, mathematics and biology ◘ Knowledge of computer programming ◘ Good knowledge of English and possibly other international languages
X Scientific Doctorate **X Professional Doctorate**
X without tuition fee (state budget funded) **X with tuition fee or with funding from other sources than the state budget**

Doctoral supervisor,

Prof. Dr. Ing. Paul Nicolae BORZA

Signature

Coordinator of the field of doctoral studies,

Prof. Dr. Ing. Ioan SERBAN

Signature