Doctoral center NITRO
Guidelines on application documents

Documents to be submitted:

- Copy of identity card
- Application for admission to the NITRO doctoral center
- Curriculum vitae and education
- Copies of the following certificates
    - Higher education entrance qualification
    - University Degree certificates (please include the respective final examination certificates) of all successfully completed university studies, specifying the grade and ECTS points*
    - For foreign certificates and diplomas: If you hold a statement of comparability confirming the equivalence of the grade and the ECTS points, please submit this. If you do not hold a statement of comparability, thank you for only submitting your university degree certificate and the equivalence will be checked on our side during the formal examination.
- If the qualifications were acquired under a different name, please provide an official proof of the name change
- Supervision and doctorate agreement
- Exposé drawn up according to our guidelines for the exposé (see next pages)

* According to § 5 PromO, the final grade of the Master's degree must be at least 2.0. If this is not the case, the grade can be compensated by evidence of outstanding academic achievements. If this is the case, please upload the relevant evidence as part of your application.

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Doctoral center NITRO
Guidelines on the exposé

The structure of the synopsis should be stringent. The synopsis *presents what* is being investigated in the dissertation*, how* and *why*.

General guidelines and recommendations

- File format: PDF
- Language: German or English (depending on the language of the dissertation)
- Citation style: IEEE or Harvard or APA
- Recommendation:
    - Min. 10 sources in the bibliography (state of research and methods, to be agreed with the supervisor)
- Length and content
    - Between 5 and 10 pages:
        - Topic
        - Classification in the program of the NITRO doctoral center
        - Current state of research
        - (Own relevant preparatory work if available)
        - (Problem definition)
        - Research question and, if applicable, hypothesis(es) to be investigated
        - Approach and methods
        - Integration into the academic research environment / university
    - In addition:
        - Cover sheet
        - Structure
        - Work schedule and timetable
        - Consistent and complete bibliography (see citation style)
        - Optional for publication-based dissertations: Milestones for which dissertation-relevant articles are to be submitted for publication

Layout

- Centering text: Justified
- Font:
    - Microsoft Word: Arial or comparable
    - LaTex: Arial or comparable, URW A030 font (package: \usepackage[scaled]{uarial})
- Font size: 11
- Line spacing: 1.15

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- Side margins:
    - Top: 2cm
    - Bottom: 2 cm
    - Right: 2 cm
    - Left: 2 cm
    - Header: Chapter
    - Footer: Page number

Content recommendations / notes

<u>General information:</u>

The time of registration at the doctoral center is individual for every doctoral candidate and therefore the lengths of the individual sections of the exposé depend on the current status of your work. For the assessment of the exposé, it is particularly important that it is recognizable that you have dealt intensively with the current state of research / knowledge and that you have elaborated your research gap together with a specific research question and the methodology you want to use to investigate / answer it.

<u>Topic:</u>

Introduce the topic of the doctorate by briefly outlining the general conditions of the research project and clarifying which disciplines are required. Briefly explain why the research project is needed. As a result, name your proposed topic.

<u>Classification in the program of the NITRO doctoral center</u>

In this section, you describe how your topic fits into the overarching context of the NITRO doctoral center. Here you show how the project supports or complements the objectives and priorities of the program.

Program: The mission of the NITRO doctoral center is to provide intelligent and sustainable technologies for resource-optimized production. This is done with three focal points:

- *When researching **intelligent production systems and processes**, methods such as AI, Industrial Internet of Things and digital twins are used.*
- *The focus area **Product Design & Materials Engineering** addresses the sustainable combination of different classes of materials and their processing methods for the manufacture of sustainable products.*
- *The focus of **Technology & Innovation** is on systemic approaches (in particular model-based systems engineering) and integrates sustainability assessments such as life cycle assessments into the evaluation of products and production.*

The key topics of sustainability and resource efficiency are an integral part of all research activities at the doctoral center.

State of research:
Provide an overview of existing research results on your research question and indicate which research gap you would like to close with your dissertation or how you would like to advance research with it.

Problem definition and research question:
Work out why the current solution approaches in research are not sufficient. Derive a main research question and any subordinate questions from this problem. The main research question is the central question that your dissertation should answer.

Procedure and methods used:
In this section, you work out your approach and the methods used in it that are needed to answer your research question. Here are some examples:
- Do you work with hypotheses? Give reasons why or why not? What assumptions are your hypotheses based on?
- How and why is data collected?
- What methods are used to analyze the data?

Integration into the academic and research environment:
In this section, describe how you will be involved in the academic environment as part of your dissertation. This primarily refers to academic exchange, for example in the context of colloquia and teaching. For example, you can indicate whether you will spend time at the partner institution, work on a collaborative research project or work in a research group at the university.

Work schedule and timetable:
Organize your dissertation into individual work packages and explain when you plan to complete them. In the case of a publication-based dissertation, you may specify milestones by which dissertation-relevant articles are to be submitted for publication. This can be set out in a project management plan or in a table, for example. If you have already completed relevant work for the doctorate, extend the timetable accordingly, starting in the past. The timetable should cover between 3 and 5 years.

Bibliography:
Provide a complete bibliography according to the citation styles defined above.