



**CHARLES UNIVERSITY**  
**Faculty of Pharmacy**  
**in Hradec Králové**

**Posudek školitele na disertační práci Mgr. Julie Marušky**

Název práce: **Teorie a aplikace postupu DoE (planování experimentu) ve farmaceutické technologii**

Studijní program: **Farmaceutická technologie**

Mgr. Julia Maruška studied at the National Pharmaceutical University in Kharkiv, Ukraine, for which she was awarded a fully funded state scholarship for a complete five year study period. Since the 1st year of her studies, she regularly participated at national scientific conferences. For her diploma thesis, she worked as an assistant in the Department of Pharmaceutical Industrial Technology and obtained experience in drug development on the base of extracts from plants. In 2013 she received a Master of Sciences of Pharmacy degree at the National Pharmaceutical University and a diploma with honors. She gathered industrial knowledge of pharmaceutical technology through her professional experience as an employee at a pharmaceutical drug distribution company.

Mgr. Julia Maruška applied for a PhD study at the faculty of Pharmacy of Charles University within the doctoral study programme Pharmaceutical technology (starting her studies in October 2018). At the moment of application, the only available theme for dissertation was an interdisciplinary subject, namely application of statistical Design of Experiments techniques in pharmaceutical technology. Although her background is not mathematical, she did not hesitate to accept the subject and immediately started to follow courses to learn more about statistics and mathematical modeling. In particular, in the summer semester of 2018 she visited the specialized course „Plánování experimentů “ taught by prof. Tošenovský, on site, at the Technical University of Ostrava and in the same semester she visited the course Basic statistics for doctoral students at the faculty of Pharmacy of Charles University. She presented a poster at the 3rd IMA Conference on Dense Granular Flows, in the Centre for Mathematical Science of the University of Cambridge in 2019 and visited the winter school „Modeling of Biomaterials” in 2020 in Kácov. She also followed a number of online courses on for example statistics, data science, AI and programming (Matlab, Python).

Mgr. Julia Maruška quickly got involved in a number of projects conducted at the Department of Pharmaceutical Technology. For example, in 2019 as a team member of the project Development of colon-targeted liquisolid systems for the local therapy of inflammatory bowel

diseases (GAUK project 70119, P.I. Mgr. Chiazor Ugo Ogadah) and as team member in the project „Increase in drug-carrier surface interactions as a tool for improving the dissolution rate of poorly soluble drugs” (GAUK project 268120, P.I. Dr. Jana Jezerská). Her contribution consisted not only of advice and discussions about the design of experiments, but she assisted as well with practical laboratory tasks.

Further, she took over the statistical evaluation of data that had been measured in the past, but not yet analyzed. This resulted in a first-author publication (IF 5.4) on the mutual influence of orifice and sorbitol particle size on flow rates for free-flowable particle fractions, where a quadratic regression model leads to accurate fits. Her skills to analyze data sets with multiple outcomes using Principal Component Analysis were used not only in a 2021 paper (IF 5.1) on the importance of the coating material type and amount in the preparation of liquisolid systems, but also in a study conducted at the Department of Pharmacology and Toxicology in the context of the project ‚Placenta in health and disease’. The results were published in Human Molecular Genetics (IF 5.1). In her second first-author publication (IF 5.2) on milling of pharmaceutical powder carrier excipients, her main task consisted of proposing a suitable design of experiments and she was responsible for its evaluation and interpretation.

Mgr. Julia Maruška passed all required exams smoothly and visited, apart from the mentioned mathematical conference in Cambridge, pharmaceutical technology conferences in Gdansk (2021) and Bratislava (2019) and attended a 4 months internship at Copenhagen University, Denmark, in 2021. With almost all conditions for PhD studies fulfilled, except for the writing of the thesis, she asked for permission to interrupt her studies in Fall 2022, because she was expecting her first child.

Mgr. Julia Maruška has been a very motivated, hard working and diligent student. It is admirable that she had the courage to embark on and persist with an interdisciplinary PhD thesis subject, because she probably underestimated the process of learning mathematical skills and mathematical ways of thinking. I appreciate the independence with which she decided to attend complementary courses and the effort she made to visit one of the few courses on Design of Experiments in the Czech Republic, in Ostrava. As far as I can judge, her knowledge in pharmaceutical technology is excellent. She has also shown to be a capable messenger in the communication between laboratory experimenters and *in silico* modelers, which can be far from trivial. In the course of her studies, she exhibited great enthusiasm for the writing of scientific texts and gradually became more independent in this respect. In my opinion, her results demonstrate that she is now able of independent scientific work. In her thesis, she presented an extended introduction into modern designs of experiments, which can be very useful for practitioners in pharmaceutical technology. I evaluate the thesis positively and recommend it for being defended.

26. 3. 2024

doc. Dipl-Math. Jurjen Duintjer Tebbens, Ph.D.  
školitel