

UNIVERSITY OF PARDUBICE	
FACULTY OF TRANSPORT ENGINEERING	
Directive No. 28/2022	
Subject:	Rules for admission to doctoral study programmes for the academic year 2022/2023
Applicable to:	Applicants for study
Issued on:	7. 12. 2021
Effectiveness:	7. 12. 2021 - 28. 2. 2023
Prepared by:	Ing. Veronika Fričová, Department for Research and Foreign Cooperation
Submitted by:	doc. Ing. Ladislav Řoutil, Ph.D., Vice-Dean for Research and Foreign Cooperation
Approved by:	doc. Ing. Libor Švadlenka, Ph.D., Dean

Article 1 Introductory Provisions

(1) The Dean of the Faculty of Transport Engineering (DFJP) of the University of Pardubice (UPa) announces, in accordance with Section 49 of Act No. 111/1998 Sb., on Universities, as amended, and Article 7 of the DFJP Statutes for the academic year 2022/2023, the admission procedure for the first year of doctoral study programmes "Transport Means and Infrastructure" and "Technology and Management in Transport".

(2) Anticipated number of admitted applicants according to study programmes and forms of study:

Study Programme	Form of study	
	Full-time	Combined
Transport Means and Infrastructure	10	10
Technology and Management in Transport	10	10

Deadlines for submission of applications: **27. 5. 2022 (First Round)**
 26. 8. 2022 (Second Round)
 20. 1. 2023 (Third Round)

Dates of the admission procedure: **24. 6. 2022 (First Round)**
 9. 9. 2022 (Second Round)
 3. 2. 2023 (Third Round)

Article 2 Admission

(1) The application for study can be submitted preferably in electronic form published at <http://eprihlaska.upce.cz>, **no later than May 27, 2022 (or August 26, 2022, or January 20, 2023, as relevant)**, including instructions.

The following documents must be sent by post to **the Faculty of Transport Engineering, Research and Development, Studentská 95, 532 10 Pardubice** no later than the closing date for applications:

- a) dissertation topic
- b) curriculum vitae
- c) certified copies of the Diploma and the Diploma Supplement

d) if submitting a proposal for their own topic of the dissertation, applicants need to provide an abstract, a proposal of methods of solution to be used in the dissertation, and the approval of the training place for which the student applies. Topics will be approved by the respective DFJP branch boards.

(2) Applicants who complete their Master's degree in the academic year 2020/2021 may submit the Diploma with the Supplement subsequently. Those who do not complete their Master's degree at DFJP UPa will, at the latest at the date of the admissions, submit at least the school's confirmation of successful completion of the Master's degree programme.

(3) The application form can also be filled in on the prescribed form (SEVT form "Application for study at a university in the doctoral study programme") and sent to the address mentioned above together with the above-mentioned attachments. The topic of the dissertation thesis is to be stated directly in the application form.

An administrative fee shall be paid by bank transfer or payment order (exclusively by Type A) to the University of Pardubice's account **no later than May 27, 2022 (or August 26, 2022, or January 20, 2023 as relevant)**.

University of Pardubice International Bank Account Number	CZ29 0100 0000 0000 3703 0561
variable symbol	5920
specific symbol	applicant's branch number (in the case of e-application)
	the applicant's birth number (in the case of the printed form)
constant symbol	379 for postal order payment
	308 for wire transfer
amount	500 CZK (Czech study program)
	2000 CZK (English study program)

(4) The printed application form must be accompanied by a proof of payment of the administrative fee (copy of the last part of the type A bill, a copy of an account statement or a payment notification if using wire transfer). If submitting the electronic application, applicants do not have to send a confirmation of payment. The administrative fee is non-refundable.

(5) An application without the attached proof of payment of the fee (if the printed form is used) or an application with formal shortcomings will not be registered and the applicant will be asked for immediate completion. If the applicant fails to remove the shortcomings within the specified deadline, he/she will be excluded from the admission procedure. A medical certificate is not required for the application.

(6) An applicant whose application has been registered but who fails to provide the required documents (see above) by the closing date for the applications will not be eligible for the entrance examination, will not be invited to it and will not be admitted.

(7) On the basis of a duly registered application and the timely submission of the required documents, the applicants will be invited to the entrance examination.

Article 3 Entrance Examination

(1) The first round of the entrance examination has been set **for June 24, 2022, the second round for September 9, 2022 and the third round for February 3, 2023**. The entrance examination will take

place at: University of Pardubice, Faculty of Transport Engineering, Studentská 95, 532 10 Pardubice. The room, time and form of the entrance examination will be specified in the invitation. The entrance examination can be carried out by means of remote access (eg Skype, MS Teams, etc.).

(2) The English language entrance exam consists of a written test in English and a personal interview in connection with the professional content of the specific topic of the dissertation. The admission exam requires at least B2 Level English according to the Common European Framework of Reference for Languages (CEFR), i.e. the applicant uses the language independently and effectively using the appropriate linguistic means. It assumes the ability to work independently with professional literature. The professional interview requires the professional knowledge of the applicants for inquiring into the issues of the submitted topic of the doctoral dissertation.

(3) If multiple applicants register the same topic of the doctoral dissertation, the admission committee determines the order of the applicants for admission according to the result of the admission procedure.

Article 4

Evaluation of the entrance examination results

(1) The foreign language is evaluated in relation to the percentage of the applicant's success rate in each part of the examination. The maximum number of points is 40, of which 30 in the written test and 10 in the oral part. The condition is to pass the written test with at least 50 percent (15 points) and the total score at least 60 percent, i.e. 24 points.

(2) The applicant may also apply for recognition of a language test on the basis of a completed State Final Examination in that language or another level-appropriate examination.

(3) Based on the result of the English language entrance examination and the following oral interview, the admission committee *recommends or does not recommend the admission of the applicant to doctoral studies*. The applicant will be informed about the result of the oral interview immediately after the interview, which will be confirmed by his/her signature on the entrance examination report, which is part of the application form.

The result of the admission procedure will be the basis for the Dean's decision on the *admission or non-admission of the applicant to doctoral studies*.

(4) Failure to attend the admission procedure for medical or other serious reasons will be subject to further discussion only if the faculty sends invitations for an alternative date for admission procedure.

(5) The results of the admission procedure will be published on the UPa website - www.upce.cz under the applicant's registration number (the applicant's university number is on the first page of the e - application form at the top right) or the applicant's birth number and initials, **no later than July 1, 2022 (or September 16, 2022, or February 10, 2023, as relevant)**. The manner of publishing the results of the admission procedure must respect the principle of the protection of personal data. Documentation on the admission procedure will be deposited with the DFJP Scientific Research Department, and will be made available to every participant in the admission procedure on request for 15 days after the admission exam. **The Dean's written resolution on the results of the admission procedure** will be received to the applicants electronically (in the case of ticking the appropriate box in the application - granting consent), upon enrollment in the study or by registered mail.

In case of non-admission to the study, the decision will be delivered by registered mail to their hands within 14 days of the date of entrance examinations.

Article 5
Final Provisions

(1) This directive has been discussed and approved in accordance with § 27 para. 1, Letter (e) of the Act by the Academic Senate of the DFJP on 1 December 2021.

(2) This Directive shall enter into force on 7 December 2021.

doc. Ing. Libor Švadlenka, Ph.D. m. p.
Dean of DFJP

Annex:

Topics for doctoral dissertation theses for the academic year 2022/2023 in the study programmes "Transport Means and Infrastructure" and "Technology and Management in Transport".

Doctoral Dissertation Thesis Topics for academic year 2022/2023 In study program Transport Means and Infrastructure

Performance assessment of lubricants and friction modifiers for the wheel-rail interface

Supervisor: doc. Ing. Petr Voltr, Ph.D.

Mode of study: full time / part time

Annotation

In railway operation, materials for lubrication or, more generally, modification of friction conditions at the wheel–rail interface are used. Laboratory assessment of performance of these materials (i.e. if and to what extent they display the required effect on friction conditions) employs twin-disc machine testing. Testing methods exist and are even reflected in European standards; in practical use, however, some uncertainties and imperfections show up. The dissertation should aim at improvement and clear definition of methodology for twin-disc testing or possibly propose new procedures. The research should also include finding correlation between results of these tests and full-scale roller rig measurements.

Research of the passage of an electrical signal between wheel and rail

Supervisor: doc. Ing. Michael Lata, PhD.

Form od study: full-time/part-time

Annotation

The passage of the signal between the wheel and the rail is very significantly related to traffic safety. In particular, its secure transmission. Recent experience shows that there is a need to increase the potential for knowledge in this area, which should be the output of this work. In this work, the problem would be summarized in terms of theory and would also focus on experiments. It would be possible to assemble a simple device for stationary tests with various modifications of the intermediate layer, for example water, sand from a sandblasting device, grease, or a friction modifier. Furthermore, the possibility of non-stationary tests on the tram wheel stand, its partial modification or extension with a variation of inputs.

Transient phenomena and combined factors in wheel–rail adhesion

Supervisor: doc. Ing. Petr Voltr, Ph.D.

Mode of study: full time / part time

Annotation

Conditions determining the adhesion performance of rail vehicles in operation result from a superposition of many factors which, in addition, can change in time. It is desirable to deal particularly with the cases of opposite effects, e.g. contamination and HPF modifier or conditioning by sliding. These phenomena are often studied in a constant slip setup, however real vehicle performance depends on realistic scenarios with variable slip. The aim of the dissertation should be to progress knowledge on combined and non-stationary adhesion phenomena with the use of roller rig experiments and modelling.

Research of selected dynamic and transient phenomena in electromechanical system of rail vehicle drives

Supervisor: doc. Ing. Michael Lata, PhD.

Form od study: full-time/part-time

Annotation

In electromechanical systems, such as the individual drive of a rail vehicle, a number of dynamic processes arise in connection with the very properties of the motor on the one hand and adhesion phenomena on the other side of this system. For a more detailed knowledge of these processes, which should be the output of this work, it is possible to use simulation calculations or use a tram wheel-rail stand and simulate these conditions here, with wide variations of parameters. This is, for example, the response of the electromechanical system to the change of selected parameters in a short period of time.

Analysis of the context of torsional dynamics of driving rail vehicles and rail surface defects (waviness)

Supervisor: doc. Ing. Michael Lata, PhD.

Form od study: full-time/part-time

Annotation

In railway operation, there are regular defects in the surface of rail tracks, both in curves and in straight track. The output of the work should be to clarify whether there is a connection between these defects and the torsional dynamics of the wheelset drive. The solution to this problem should be mainly in the field of simulations and modeling, a detailed description of the adhesion parameters between the wheel and the rail and the conditions of self-excited oscillations are also assumed.

Physical energy pretreatment of metallic materials for glue joint at transport vehicle construction

Supervisor: doc. Ing. Pavel Švanda, Ph.D.

Form od study: full-time/part-time

Annotation

Aim of this work is to study of pretreatment of metallic surface by physical energy for glue joints. The surface pretreatment may be usage at transport vehicle manufacturing. Theoretical part of study will be target the selection of suitable pretreatments. In practical part of study will be evaluate the surface state before and after pretreatments. In the work will be study the strength of prepared glue joints and their stability during service life.

Formation of Gradient Layers of Multiphase High-Strength Steels

Supervisor: prof. Ing. Eva Schmidová, Ph.D.

Form od study: full-time

Annotation

The doctoral work will be focused on the research of high-strength steels, applied for transport means. Analysis of processes associated with new approaches to the creation of gradient layers, incl. degradation processes caused by welding are the core part of the work. Complex material analyses will be used for the research of the acting strengthening vs. relaxation processes. According to the specific application, the influence of the high strain rate and internal imperfections is intended to be expressed and verified experimentally.

Localization of deformation response of materials depending on loading rate

Supervisor: prof. Ing. Eva Schmidová, Ph.D.

Form od study: full-time / part-time

Annotation

The doctoral work will be focused on the experimental analyzes of dynamic loading effects on the destruction process of materials applied for transport means. Methodologically, structural analyses, analyses of fracture behaviour – fractography and indentation tests will be included. The aim is to obtain new information about the failure mechanism of advanced materials, working with dynamic reinforcement principles under service load.

Fatigue curve determination using non-destructive method

Supervisor: doc. Ing. Bohumil Culek, Ph.D.

Form od study: full-time/part-time

Annotation

Content of the thesis will be:

- statistical comparison of different approaches to determination of the material characteristics as parameters of fatigue curves;
- proposal of methodology for determination of the fatigue curve of the construction node by means of a non-destructive method;
- use of computer models and simulations to determine fatigue life of steel structures;
- verification of the methodology by experimental testing.

The aim will be to develop a methodology for determination of material characteristics of the fatigue curve by non-destructive method, to verify this methodology by experimental testing.

Identification of fatigue crack propagation

Supervisor: doc. Ing. Bohumil Culek, Ph.D.

Form od study: full-time/part-time

Annotation

Content of the thesis will be:

- literature search of current state of knowledge, identification method of fatigue crack propagation;
- Sensitivity analysis of the Beach Mark method;
- Proposal of methodology focused on using Beach Mark method with regard to material grade and sample geometry.

The aim will be to develop a methodology of evaluation of the fatigue crack propagation by identifying the fracture surface based on the change in loading shape during the fatigue test (Beach Mark method).

Stochastic analysis of concrete structure

Supervisor: doc. Ing. Ladislav Řoutil, Ph.D.

Form od study: full-time/part-time

Annotation

Simulation of mechanical response and damage of concrete structures including random nature of input parameters, comparison to experimental results. Influence of degradation/corrosion of concrete

and estimation of structures lifetime. Comparison of stochastic analysis and design according to codes. Statistical, sensitivity and probabilistic analyses. Case studies, application of results to design, assessment, maintenance, retrofitting and strengthening of structures.

Retrofit of flexural-bond failed reinforced concrete (RC) columns with substandard configuration: Experimental and stochastic study

Supervisor: doc. Ing. Ladislav Řoutil, Ph.D.

Co-supervisor: Ing. Özgür Yurdakul, Ph.D.

Form od study: full-time/part-time

Anotation

The response of bond-slip dominated, flexural failed substandard as-built and strengthened RC columns is investigated. First, column specimens constructed from low strength concrete, and plain round bars with improper hook details simulating non-engineered structures are tested under cyclic loading. Owing to martensitic phase transformation, SMA bars from Nickel-Titanium (NiTi) have the super-elastic attribute by which they can return to original shapes with a negligible residual deformation after load removal. Therefore, reinforced concrete (RC) columns strengthened with SMAs have a self-centering feature under cyclic loading, which can eliminate the bond-slip failure and upgrade the performance of RC members. The innovative retrofit strategy is then compared with the conventional retrofit approach, use of Carbon Fiber Reinforced Polymers (CFRP). Besides, the computational stochastic mechanics combining numerical models with a stochastic approach is implemented to reproduce the scatter arising from uncertainties.

Doctoral Dissertation Thesis Topics for academic year 2022/2023
in study program
Transport Technology and Management

Decision models with uncertainty in transport

Supervisor: Assoc. Prof. Jiri Krupka

Supervisor specialist: will be specified

Form of study: full-time / part-time

Annotation

The dissertation deals with modelling of decision-making and group decision-making of a selected problem. The problem focuses to an issue of transportation. It is assumed that the problem is part of Industrial Internet of Things or Industry 4.0. The thesis summarizes and analyses an available information and methods that are able to work with uncertainty. The model is proposed on the basis of the system approach and soft systems methodology. A core of the model will be proposed based on the fuzzy set theory, rough set theory and their combination. The model will be verified on a case study.

Systems of automatic identification in relation to the Supply Chain Management

Supervisor: doc. Ing. Libor Švadlenka, Ph.D.

Supervisor specialist: Ing. Roman Hruška, Ph.D.

Form of study: full-time

Annotation

The dissertation will deal with the automatic identification systems used in logistics processes (e.g. storage, picking, distribution, transportation of materials, etc.) in supply chains in conditions today's increasingly globalizing world. Currently, these systems of automatic identification represent together with modern information technologies to obtain the potential for increasing the competitiveness of individual supply chain and thus also its individual parts. This trend provides to the student space for scientific research in this area.

The aim of the dissertation is to propose a system of automatic identification in relation to Supply Chain Management (SCM) for more efficiency logistic processes through the supply chain with an emphasis on increasing its competitiveness. Student proves the functionality of the proposed system by its practical application in the chosen logistic chain.

Student will use facilities and equipment of laboratory of automatic identification and will be able to do experimental measurements to help him to verify his assumptions and suggestions related to his dissertation.

Student will analyse the current state of the issue solved in the Czech Republic and abroad to achieve this aim.
