# Information sheet for the course
# Optimisation of Mechanical Systems

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| **University:** *Alexander Dubček University of Trenčín* | |
| **Faculty:** *Faculty of Industrial Technologies in Púchov* | |
| **Course unit code:** *MI-I-V-20* | **Course unit title:** *Optimisation of Mechanical Systems* |
| **Type of course unit:**<br>   -   *the given subject is **optional (elective)*** | |
| **Planned types, learning activities and teaching methods:**<br>*Lecture: 2 hours weekly/26 hours per semester of study; face to face*<br>*Seminar: 0*<br>*Laboratory tutorial: 0*<br>   - | |
| **Number of credits:** *2* | |
| **Recommended semester:**<br>   *the $3^{rd}$ semester in the $2^{nd}$ year of the full-time form of study*<br>   *the $3^{rd}$ semester in the $2^{nd}$ year of the part-time form of study* | |
| **Degree of study:** *the $2^{nd}$ degree of study (Engineering degree)* | |
| **Course prerequisites:** *none* | |
| **Assessment methods:**<br>*To accomplish the given subject, student is obliged to be present at the lessons with the reference to specifications introduced in the study rules for the given study programme. He/she is also obliged to elaborate and defend the project which is closely connected with numerical solution of one task relating to cross-sectional and shape optimisation of the model by help of finite element method.* | |
| **Learning outcomes of the course unit:**<br>*Student is able to solve the specific tasks which are closely connected with cross-sectional and shape optimisation of the models by help of finite element method.* | |
| **Course contents:**<br>• *Minimisation of the function with one variable, minimisation of the function with several variables.*<br>• *Introduction to the optimisation methods: Simplex method – Nelder-Mead algorithm, Hooke-Jeeves method, gradient method, the steepest descent method, method of conjugate gradients.*<br>• *Quasi Newton methods, penalty and barrier methods.*<br>• *Optimisation by help of finite element method and susceptibility or sensitivity analysis.*<br>• *Cross-sectional optimisation of bar, beam and thin shell constructions.*<br>• *Shape optimisation.* | |
| **Recommended or required literature:**<br>*Lederer P.: Teória a optimalizácia mechanických systémov I, edičné stredisko ČVUT Praha, 1*<br>*Hamala I.: Nelineárne programovanie, Alfa, Bratislava, 1976*<br>*Brunovská A.: Malá optimalizácia. Metódy, programy, príklady, Alfa, Bratislava, 1990*<br>*Buchanan J., Turner P., R.: Numerical methods and analysis, McGraw-Hill, Inc., New York, 1992* | |
| **Language:** *Slovak language (the initial language of the educational process)* | |
| **Remarks:** — | |

**Evaluation history:  /Grading system/**

| A | B | C | D | E | FX |
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| *Excellent* | *Laudable* | *Good* | *Accepted results* | *Pass* | *Fail* |

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| **Lecturers:** *prof. Ing. Ján Vavro, PhD., doc. Ing. Ján Vavro, PhD.* | |
| **Last modification:** *3.03.2014* | |
| **Supervisor:** *prof. Ing. Darina Ondrušová, PhD.* | |