

<b>Course title:</b> Optimization of engineering structures	<b>Neptun code:</b> GEVGT467-a
<b>Course coordinator:</b> Dr. Jármai, Károly, professor, DSc.	
type and number of lesson: 2 lectures/consultations/week	
method of accountability: practical mark	
curriculum location of the subject: autumn and spring	
pre-study conditions: GEVGT465-a, GEVGT466-a	
<b>The task and purpose of the subject:</b>	
To familiarise students with the most important methods of optimal sizing of engineering structures	
<b>Course description:</b>	
CAD methods in the analysis of engineering structures. Determination of stresses and strains in simple structures. Design of I- and cabinet supports. Structure characteristics. Strength calculation of simple lattice tubular structures, stiffened plates. Objective functions, design conditions: strength and fabrication. Mathematical methods of single objective function optimal sizing, computer algorithms (Backtrack, SUMT, Complex, Hillclimb, Linear, Sequential Quadratic Programming, Flexible Tolerance, Leap-frog, Dynamic-Q, etc.). Mathematical methods of multi objective function optimization, their application to sizing of structures. Decision support systems. Expert frameworks. Evolutionary methods, application of neural networks. Linking structure optimisation and expert frameworks. Costs, cost reduction, economics. Optimal sizing of welded I- and cabinet supports. Optimization examples for tubular and frame structures, stiffened plates.	
<b>Required literature:</b>	
<ol style="list-style-type: none"> <li>1. Farkas, J., Jármai, K.: Optimum design of steel structures, Springer Verlag, Heidelberg, 2013.</li> <li>2. Farkas, J., Jármai, K.: Design and optimization of Metal Structures, Horwood Kiadó, 2008.</li> <li>3. Farkas, J., Jármai, K.: Economic Design of Metal Structures, Millpress Kiadó, 2003.</li> <li>4. Farkas, J., Jármai, K.: Analysis and Optimum Design of Metal Structures, Balkema Kiadó, 1997</li> </ol>	
<b>Recommended literature:</b>	
<ol style="list-style-type: none"> <li>1. G. Venter: Review of Optimization Techniques, Encyclopedia of Aerospace Engineering. 12 p. Edited by Richard Blockley and Wei Shyy. 2010 John Wiley &amp; Sons, Ltd</li> <li>2. R. Venkata Rao &amp; Vimal J. Savsani: Advanced Optimization Techniques, Mechanical Design Optimization Using Advanced Optimization Techniques 2012, <a href="https://link.springer.com/chapter/10.1007/978-1-4471-2748-2_2">https://link.springer.com/chapter/10.1007/978-1-4471-2748-2_2</a></li> <li>3. Xin-She Yang: Optimization Techniques and Applications with Examples, Wiley, 349 p. <a href="https://books.google.hu/books?hl=hu&amp;lr=&amp;id=KBxtDwAAQBAJ&amp;oi=fnd&amp;pg=PR12&amp;dq=optimization+techniques&amp;ots=-T7WYKvQWb&amp;sig=OuqnjtCgYgHQKhWBjbmMLLWk3Jk&amp;redir_esc=y#v=onepage&amp;q=optimization%20techniques&amp;f=false">https://books.google.hu/books?hl=hu&amp;lr=&amp;id=KBxtDwAAQBAJ&amp;oi=fnd&amp;pg=PR12&amp;dq=optimization+techniques&amp;ots=-T7WYKvQWb&amp;sig=OuqnjtCgYgHQKhWBjbmMLLWk3Jk&amp;redir_esc=y#v=onepage&amp;q=optimization%20techniques&amp;f=false</a></li> </ol>	