TÁRGYLEÍRÁSOK

Tárgy neve: **Graph Theory and Algorithms**

Tárgyfelelős neve: Csikvári Péter

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: has the ability to apply deep learning and other state-of-the-art methods for modelling data, based on the algorithms learned
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

Understanding the basic concepts of graph theory and complexity theory.

Understanding the difference between polynomial and exponential running time algorithms.

Formalizing real world problems about networks in the language of graphs and algorithms.

Graphs and directed graphs, bipartite graphs, degree of a vertex, handshake lemma
Connectedness, connected components, spanning trees, breath-first search tree, paths and distances in graphs
Cliques and colorings.
Finding shortest path in a graph, Dijkstra's algorithm, Ford's algorithm

Matchings, Hall-theorem for matchings in bipartite graphs, matchings in non-bipartite graphs, stable matchings
Sorting and operations on data structures
Algorithms, Turing machine, computational complexity, P vs NP, reductions of algorithmic problems
Adjacency matrix, eigenvalues of graphs

A számonkérés és értékelés rendszere angolul: exam

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

S. Even: Graph algorithms, Cambridge University Press, 2nd edition, 2012.

J.A. Bondy, U.S.R. Murty: Graph Theory, Springer Graduate Texts in Mathematics, 2010.

Tárgy neve: **Basics in linear algebra and numerical methods**

Tárgyfelelős neve: Izsák Ferenc

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: has the ability to apply deep learning and other state-of-the-art methods for modelling data, based on the algorithms learned, and is able to apply up-to-date data analysis tools
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

The students learn the basic linear algebraic notions and operations and some corresponding efficient numerical methods.

They are able to use the related subroutines in Matlab or Python and understand their role in the architecture of neural networks.

Linear algebra refreshing: vectors, matrices, basic operations. Subspaces, range of matrices. Linear systems.
Introduction to Python. Matrix manipulations in Python.
Operations with sparse matrices.
Numerical solution of linear systems, number of operations. Eigenvalue problems, eigenvalue decompositions. Eigenvalues of stochastic matrices.
Numerical methods for finding eigenvalues: power method and Arnoldi method.
Dimension reduction, generalized eigenvalues, SVD decomposition.

Random variables, expected value, variance.Main examples: uniform and normal probability distribution. Samples, parameter estimations. Confidence intervals.
Distance: metrics and norms, objective functions, parameters.
Existence of global and local extrema: connection with convex functions.
Linear regression. Minimization methods; the gradient method. Role of initialization.

A számonkérés és értékelés rendszere angolul: exam

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

L.N. Trefethen and D. Bau: Numerical Linear Algebra, SIAM Publications, Philadelphia, PA, 1997.

H.P. Langtangen: A Primer on Scientific Programming with Python, 3rd ed., Springer, 2012

L.N. Trefethen and D. Bau III (1997). *Numerical Linear Algebra*, SIAM Publications, Philadelphia, PA, 1997.

Tárgy neve: **Optimisation**

Tárgyfelelős neve: Bérczi Kristóf

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: has the ability to apply deep learning and other state-of-the-art methods for modelling data, based on the algorithms learned, and is able to apply up-to-date data analysis tools
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

Knowledge of basics of combinatorial optimisation, including elements of linear programming.
Understanding the main ideas of LP solving techniques.
Ability to recognize convex programming problems, knowledge of gradient descent algorithm.

Basics of linear programming: linear equations, Gauss elimination, Fredholm alternative theorem, polyhedra, polytopes. Linear inequalities: basic feasible solutions, Farkas lemma, Duality theorem. Simplex algorithm: general idea, performance, variants

Interior point methods: affine scaling, potential reduction, path following methods

Large scale optimization: column generation, cutting plane methods

Heuristics: branch and bound, dynamic programming, local search, simulated annealing

Preliminaries: calculus, linear algebra, matrices and eigenvalues

Convexity and optimization: convex sets, convex functions, convex optimization. Duality: Lagrangian dual, conjugate function.

Gradient descent: general idea, Lipschitz gradient, application: maximum flows in graphs

Mirror descent and Multiplicative weight update method: regularizers, exponential gradient descent, multiplicative weights update framework, application: bipartite matching.

Stochastic gradient descent: background, iterative method, extensions.

Newton's method: Newton-Raphson method, Newton's method for unconstrained optimization, Newton's method as gradient descent

A számonkérés és értékelés rendszere angolul: term mark

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

András Frank. Connections in combinatorial optimization. Oxford Lecture Series in Mathematics and Its Applications 38, 2012.

Dimitris Bertsimas, John N. Tsitsiklis. Introduction to linear optimization. Belmont, MA: Athena Scientific, 1997.

Nisheeth Vishnoi. Algorithms for Convex Optimization.

Tárgy neve: **Python for Data Science**

Tárgyfelelős neve: Grolmusz Vince

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: is familiar with the modern methods of data science
- képesség: is able to use effective data visualisation and to shed light on hidden relations within big datasets and to apply up-to-date data analysis tools
- attitűd: prefers algorithmic solutions, based on precise conditions
- autonómia: need to independent work based on the relevant publications, to apply the continuously developing methodology
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

Python Basics (standard library):

Efficient data manipulating (NumPy, Pandas)
- NumPy array, universal functions, array-oriented programming, linear algebra, random number generation
- Pandas data structures (Series, DataFrame), file handling, data cleaning, data preparation, join, grouping, time series

Data visualization (Matplotlib): line plots, scatter plots, histograms, customizing, multiple subplots, 3D plotting, Seaborn

Machine learning basics (scikit-learn): model validation, grid search, feature engineering, linear regression, support vector machines, decision trees, random forests, knn, XGBoost

A számonkérés és értékelés rendszere angolul: term mark

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

Jake VanderPlas: "Python data science handbook: essential tools for working with data." O'Reilly Media, Inc., 2017

Wes McKinney: "Python for data analysis: Data wrangling with Pandas, NumPy, and IPython". O'Reilly Media, Inc., 2018 (2nd edition)

Tárgy neve: **Network Science**

Tárgyfelelős neve: Csikvári Péter

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: has the ability to apply deep learning and other state-of-the-art methods for modelling data, based on the algorithms learned, and is able to apply up-to-date data analysis tools
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

Being familiar with modelling of large networks.
Understanding the basic measures of models and the role of linear algebra in network science.

Clustering coefficients and other network measures.

Spectral graph theory, pseudorandom graphs and expander graphs.

Expander graphs and derandomization.

Page rank algorithm and variants.

Graph isomorphism problem and molecule databases.

Random graph models: Erdős-Rényi random graphs.

Random graph models: Barabási-Albert model.

A számonkérés és értékelés rendszere angolul: term mark

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

A. Blum, J. Hopcroft, R. Kannan: Foundations of Data Science, Cornell University preprint, 2018, available at https://www.cs.cornell.edu/jeh/book.pdf

S. Jukna: Extremal Combinatorics with Applications in Computer Science, Springer, 2011.

A. Rajaraman, J. Leskovec, J. D. Ullman: Mining of Massive Datasets, Cambridge University Press, 2011.

A.-L. Barabási: Network Science, Cambridge University Press, 2016.

Tárgy neve: **Statistical learning**

Tárgyfelelős neve: Prokaj Vilmos

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: has the ability to shed light on hidden relations within big datasets, and is able to apply up-to-date data analysis tools
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

Regression and classification, the variance-bias trade-off.

Regularization. Ridge regression and Lasso. Generalized additive model.

Decision trees.

Support vector machine.

A számonkérés és értékelés rendszere angolul: exam

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

Hastie, T.; Tibshirani, R. & Friedman, J. (2009), *The elements of statistical learning*, Springer, New York.
James, G.; Witten, D.; Hastie, T. & Tibshirani, R. (2013), *An introduction to statistical learning*, Vol. 103, Springer, New York.

Tárgy neve: **Data Mining Models and Algorithms**

Tárgyfelelős neve: Lukács András

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 12

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: has the ability to solve data scientific projects on his own and in a team, and is able to apply up-to-date data analysis tools
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

Understanding the basic approach and methodology of data mining; knowledge of models, algorithms and tools to solve main tasks of data mining; planning and implementing simple data mining projects.

Knowledge discovery process, data preprocessing and exploration. Human-computer interaction in data mining, data visualization, visual analytics. Relational, multidimensional and stream data models. Data warehouses, Online Analytical Processing.
Feature engineering. Dimensionality reduction, singular value decomposition, Principal component analysis. Feature selection, measuring importance, wrapper and model-based methods.
Classification and regression. Performance evaluation, Receiver operating characteristic-curve, overfitting, sampling techniques. Decision trees, rule-based methods, nearest-neighbour classifier. Naive Bayes classifier and Bayesian networks. Perceptron, multilayer neural networks, backpropagation. Support

Vector Machine, kernel trick. Ensemble methods, bagging, boosting models, Random Forests. Linear and logistic regressions, connection with classification methods. Class-imbalanced data.
Unsupervised learning. Cluster analysis, k-means and its generalizations, hierarchical and density-based methods. Model based clustering, maximum likelihood estimation, EM-method. One-class classification, outlier detection. Approximating densities. Isolation trees.
Association rule mining, frequent itemset and pattern mining. Apriori and Frequent Pattern-Growth algorithms. Constraint-based frequent pattern mining.

A számonkérés és értékelés rendszere angolul: term mark

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

P. N. Tan, M. Steinbach, V. Kumar: Introduction to Data Mining (2nd edition), Pearson, 2018

J. Han, M. Kamber, J. Pei: Data Mining: Concepts and Techniques (3th edition), Elsevier, 2012

J. Friedman, T. Hastie, R. Tibshirani: The Elements of Statistical Learning (2nd edition), Springer, 2009

A. Rajaraman, J. Leskovec, J. D. Ullman: Mining of Massive Datasets, Cambridge Univ. Press, 2014

Tárgy neve: **Mathematical modelling practice**

Tárgyfelelős neve: Zempléni András

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: is able to apply artificial intelligence for solving different industrial and financial problems, and to apply up-to-date data analysis tools (e.g. Scikit-learn, TensorFlow, Keras, PyTorch); is able to solve data scientific projects on his own and in a team
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

The experts of the partner companies present problems, which are interesting for them and which can be investigated by artificial intelligence. The students choose from these practical problems, working in a group of 3-4. Their work is supported by the external expert, who proposed the problem, together with an internal consulent. The task of the students is to investigate the data scientific methods applicable to the given problem by using the learned approaches, to study the relevant literature, to implement the planned approaches, to evaluate the results and to sketch methods for further improvements, and possibly to optimise the planned approaches, to investigate the possible generalisations. At the end of the semester a summary of about 10 pages and an oral presentation of 15 minutes is expected. The term mark is determined by the written report and the oral presentation evaluated by the supervisors.

A számonkérés és értékelés rendszere angolul: term mark

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom: -

Tárgy neve: **Data Analysis for Time Series**

Tárgyfelelős neve: Márkus László

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: is able to apply up-to-date data analysis tools
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

The students learn the most important notions of time series, needed for building more complex models.

They are able to use the related subroutines in R or Python and understand their role in the architecture of neural networks.

Trend and Seasonality Analysis (Moving average, Spline, LOESS, autokorrelation, spectrum, differentiation)
Interdependence (Association) Analysis (autokorrelation, autocopula, cointegration)
Forecasting (Dynamic regression, ARIMA, vector autoregresion VAR)
Temporally Changing Variance (ARCH – GARCH, MVGARCH)
Short and Long Memory (Hurst exponent, Fractionally integrated time series)
Model Selection by Information Criteria (Akaike, Bayes, Hannan-Quinn, minimum description/message length). Bayesian Stuctural Time Series Model
Machine Learning Techniques for Panel Data

LSTM* Networks for Classifying, Processing and Making Predictions Based on Time Series Data

A számonkérés és értékelés rendszere angolul: term mark

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

Paul S.P. Cowpertwait, Andrew V. Metcalfe: Introductory Time Series with R, Springer 2009.
Ruey S. Tsay: Multivariate Time Series Analysis, with R and Financial Applications, Wiley 2014.
Rob J Hyndman and George Athanasopoulos: Forecasting: Principles and Practice, Monash University, Australia, 2018. available online at https://otexts.org/fpp2/

Gianluca Bontempi, Souhaib Ben Taieb, Yann-Aël Le Borgne: Machine Learning Strategies for Time Series Forecasting. https://link.springer.com/book/10.1007/978-3-642-36318-4

Daniel J Henderson, Raymond J Carroll, and Qi Li. Nonparametric estimation and testing of fixed effects panel data models. Journal of Econometrics, 144(1):257-275, 2008.

Tárgy neve: **Advanced modelling for Big Data and AI**

Tárgyfelelős neve: Lukács András

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: has the ability to state-of-the-art methods for modelling data, based on the algorithms learned, and is able to apply up-to-date data analysis tools, to use effective data visualisation
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

Understanding mathematical theory of learning; knowledge of models and algorithmic techniques for analysing data of high volume and large complexity; knowledge of methods for special type of data and domain of problems.

Mathematical and statistical foundation of data mining, learning and models. High-dimensional data, similarity and distance measures, embeddings. Nearest neighbour problem, minhashing. locality-sensitive hashing, sketches, Johnson-Lindenstrauss. Methods for data streams: sampling, Bloom filter, counting distinct elements, estimating moments.

Large-scale machine learning: map-reduce model, linear algebraic and database tasks with map-reduce. Reinforcement learning, Q-learning.

Models for time-series. Dynamic Time Warping. Symbolic Aggregate Approximation. Graphical models, Markov chains

Link analysis in networks. PageRank, Hyperlink-Induced Topic Search.

Recommendation systems, utility matrix, profiles, collaborative filtering, UV-decomposition.

A számonkérés és értékelés rendszere angolul: exam

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

S. Shalev-Shwartz, S. Ben-David: *Understanding Machine Learning: From Theory to Algorithms*, Cambridge University Press, 2014

C. M. Bishop: *Pattern Recognition and Machine Learning*, Springer, 2006

A. Rajaraman, J. Leskovec, J. D. Ullman: *Mining of Massive Datasets*, Cambridge Univ. Press, 2014

Tárgy neve: **Deep Learning**

Tárgyfelelős neve: Lukács András

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the most important algorithms of artificial intelligence and with the most important models and types of machine learning and neural networks
- képesség: has the ability to apply deep learning and other state-of-the-art methods for modelling data, based on the algorithms learned, and is able to apply up-to-date data analysis tools (e.g. Scikit-learn, TensorFlow, Keras)
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and is familiar with the most important algorithms of artificial intelligence and with the most important models and types of machine learning and neural networks
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

Understanding neural networks and their teaching; knowledge and ability to use several types of deep neural networks, application of neural networks for different types of data.

Neural networks, activation functions. Teaching methods, back propagation. Convolutional Neural Network. Techniques: dropout, maxout, ReLu, batch normalization. Object recognition on images, YOLO, R-CNN.
Recurrent neural networks, long short-term memory (LSTM), gate recurrent unit (GRU). Generative models: autoencoders, Variational Autoencoders, Generative Adversarial Networks, Deep Belief Networks.

Natural Language Processing: representations, Word2vec, Glove. Time series, sound, speech processing, generation, WaveNet.
Boltzmann machines.
TensorFlow, Keras, Theano

A számonkérés és értékelés rendszere angolul: term mark

Idegen nyelven történő indítás esetén az adott idegen nyelvű irodalom:

Goodfellow, Ian, Yoshua Bengio, and Aaron Courville. *Deep learning*. MIT press, 2016.

Chollet, Francois. *Deep Learning with Python*. 2017.

Tárgy neve: **Project work**

Tárgyfelelős neve: Zempléni András

Tárgyfelelős tudományos fokozata: PhD

Tárgyfelelős MAB szerinti akkreditációs státusza: A(T)

Előtanulmányi feltétel: ---

Kreditszám: 6

Az oktatás célja angolul:

- tudás: getting familiar with the modern methods of data science and with the most important algorithms of artificial intelligence
- képesség: has the ability to apply deep learning and other state-of-the-art methods for modelling data, based on the algorithms learned, is able to apply up-to-date data analysis tools, and to solve data scientific projects on his own
- attitűd: tries to explain the phenomena by the learned mathematical way of thinking and prefers algorithmic solutions, based on precise conditions
- autonómia: to shed light on hidden relations within datasets, using mathematically well-founded methods and the need to independent work based on the relevant publications, to apply the continuously developing methodology
- felelősség: the creative application of the mathematical approach, being aware of the limits

Az oktatás tartalma angolul:

He/she is able to solve projects in data science both individually and in groups and to apply artificial intelligence for solving different problems emerging in industrial or financial area.
His/her attitude is to try to create a precise explanation of the phenomena, applying the learnt mathematical thinking.
He/she is able to apply modern data analytical tools (e.g. Scikit-learn, TensorFlow, Keras, PyTorch) and for effective data visualisation.

He/she can summarize his/her work in a precise written way, including a summary of the related literature.

Az oktatás tartalma angolul:

To work and to summarise the subject chosen by the student, under the supervision on an expert. To write a thesis of about 20-30 pages, which also links the work to the existing approaches in the literature.

A számonkérés és értékelés rendszere: term mark, based on the written work and its defense in the form of a final exam

Irodalom: -

1. **Az értékelési és ellenőrzési módszerek, eljárások és szabályok, valamint a minőségbiztosítás módjának bemutatása**

   A szakirányú továbbképzés minőségbiztosításának főbb szempontjai:

   - a szakterület vezető oktatói tartják a képzést
   - a lehetséges, rendelkezésre álló módon meg fog történni az oktatói munka hallgatói véleményezése
   - az elméleti ismereteket és a gyakorlati tananyagokat rendszeresen felülvizsgáljuk és a legújabb releváns eredményekkel kiegészítjük.

2. A **korábban szerzett ismeretek, gyakorlatok beszámításának rendje:** Beszámításra az alapozó tárgyak esetén van mód, a szakfelelős véleménye alapján, indokolt esetben.