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| **Title and code** of the subject: **Environmental informatics – Environmental monitoring MTMKG7003A** | **ECTS Credit Points: 3** |
| **Type** of the subject: compulsory |
| **Ratio of theory and practice:** (credit%) **70/30** |
| **Type and number of classes per semester**: 28 hour(s) lecture and 14 hour(s) practice per **semester** Number of teaching hours / week : 2+1 (lecture and practice) |
| **Type of exam**: exam  |
| **Subject in the curriculum:** semester 1 |
| Preliminary requirements:- |

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| **Summary of content - theory**:  |
| Course objectives:Students are acquainted with and master the renewable and non-renewable natural resources and geospatial assessment, change detection, the theory and practise of spatial decision support systems. They will be able to work in their environmental management work and operate geospatial and remote sensing software. They acquire knowledge related to enhancing environmental monitoring systems.1. Local and international environmental geospatial projects.
2. Environment information systems on the Internet, data warehouses and metadata
3. The construction and operation of environmental management information systems, environmental elements and related IT tasks
4. Characterization, collection and data structures of digital environmental management data related requirements.
5. Modelling the environment.
6. Modelling soil and water
7. Hydrology environmental models
8. Surface and groundwater modelling
9. Landscape protection and landscape evaluation models
10. Space and time change assessment - Geostatistics basics
11. Basics of Remote Sensing.
12. Geoinformatics model of single-factor decision-making systems.
13. Applied, complex multi-factor decision-making systems.
14. Decision support modelling solutions
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| **Summary of content - practice**: |
| Skills to be learnt:1. Surfer GUI
2. Surfer colour management
3. Surfer data management
4. Grid DEM
5. Data importing
6. Basic Data statistics
7. DAT data types
8. Griding methods
9. Grid report evaluation
10. Accurate interpolations
11. IDW, TIN
12. Global interpolations
13. Kriging
14. Error propagations
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| **Literature, handbooks in English**  |
| 1. Janardhana Raju et al. (2015)Management of natural resources in a changing environment. Springer Publ. ISBN 9783319125589
2. Lichtfouse E. Goyal A. (2015) Sustainable Agriculture Reviews 16. Spriger Publ. ISBN 9783319169873
3. GoldenSoftware(2018) Surfer Manual https://www.goldensoftware.com/products/surfer
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| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:**

- Possessing agricultural, food chain safety, natural sciences, environmental, nature conservation, engineering, and economics general and specific knowledge of study areas.- Know in detail the design and implementation of the field of activity of the profession, its implementing methods, rules and related features.- Familiar with agricultural production, environmental protection and nature conservation, natural sciences, agricultural production, environment, as well as with the production of healthy, high-biological quality products.- They have acquired the relevant knowledge of sustainable farming, they are in the possession of the most up-to-date knowledge of cultivation technology, knowledge of research and development1. **Skills:**

- They are capable of a multidisciplinary, interdisciplinary approach to professional issues.- They are capable of identifying specific professional problems and solving them to explore and formulate a detailed conceptual and practical background.- Possess different areas of ideas that form the knowledge system of the given field of expertise for a detailed analysis of the comprehensive and specific contexts.- They are able to formulate a synthetic evaluation formulation and report of the results of the analysis making.- They are able to define, design, organization.- Being able to engage in research and development projects1. **Attitude:**
* Being able to engage in research and development projects
* Recognize values, responsive for new methods and tools that are help more effective application.

They are strongly committed to resolving problems on a professional basis.* Their professional interest is deepened and engaged.
* They are committed to environmental protection, nature conservation and a sustainable agrarian economy.
* Frankness, initiating, empathetic.
1. **Autonomy and responsibility:**
* They have considerable autonomy with comprehensive and specialized professional issues environmental management in the implementation, representation and explanation of professional engineering.
* They are capable of independent, environmentally-friendly management, the application and development of modern agricultural technologies.
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| **Responsible lecturer: Prof. János Tamás** |
| **Other lecturer(s): Dr. Bernadett Gálya**  |

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| **Terms of course completion:** |
| 1. Completing assignments / exercises
2. Submitting essay
3. Giving presentation
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| **Form of examination:** |
| written exam |
| **Requirement(s) to get signature:** |
| Active participation in lectures and exercises, is a successful fulfillment of the tasks defined by the lecturer. |

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| **Exam questions:** |
| 1. Primer data acquisition
2. Seconder data acquisitions
3. Vector data model
4. Topological relationships of polygon
5. Topological relationships of TIN
6. Conceptual model
7. Object types, data integration
8. Raster conversation
9. Geoprocessing with raster
10. Physical model implementation
11. Colours modelling
12. Meta data structures
13. Attributive data sources,
14. RDBM
15. Geo mathematics
16. Site selection
17. Monitoring strategy
18. Spatial decision supporting
19. Spatial estimations accurate interpolations
20. Global interpolations
21. Error propagations
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