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| **Title and code** of the subject: **Floodplain management, MTMVG7009A**  | **ECTS Credit: 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 classes per week: 2+1 |
| **Type of exam**: exam & practical course mark |
| **Subject in the curriculum:** semester 2 |
| Preliminary requirements:- |

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| **Summary of content - theory**:  |
| Course objectives:The purpose of the course is to provide the student with an understanding of the principles and current practices for managing floodplains, and other flood hazard areas, to bring about flood-loss reduction and natural resource protection, emphasizing multi-disciplinary approaches to management. Students will learn the relationship between the hydrology, hydraulics, ecology, river morphology. Students gain knowledge about the impacts of human activities on floodplains and the basic possibilities of river corridor restoration. Within integrated river basin management, river valley is presented as an ecological entity along with its flood and inland water protection, water resource management and environmental and nature conservation aspects. The latter are concerned with the role of floodplain and backwaters in landscape protection, in the ecological corridor network, in recreation, in aquatic and ecotourism. The possibilities for river and wetlands restoration are also reviewed.1. The concept of floodplain. History of flood management. Floodplain management as part of water resources management. Integrated river basin management and water resource management in the river valley.
2. The hydraulics of the streams.
3. The fluvial geomorphology of the streams and river corridors.
4. Geomorphological and ecohydrological properties of the rivers and river valley.
5. River ecology. The river as a living ecosystem (River continuum and Flood Pulse Concept)
6. The types of floods and floodplains;
7. The river and floodplain classification. The Rosgen classification.
8. The hydrologic computational techniques. Risk assessment.
9. Flood hazard studies; discussion of floodplain management plan.
10. Flood damage reduction strategies and tools.
11. Natural functions and resources of floodplains and their value.
12. Strategies and tools to preserve and/or restore natural and beneficial floodplain resources.
13. Floodplain Management and Protection of Wetlands.
14. River corridor and watershed management
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| **Summary of content - practice**: |
| The general purpose of the exercises is to give students a realistic picture of the situation and opportunities of flood management, the relationship between the agricultural and water management, flood management, environmental and nature protection activities on the floodplains.1. Assessment of the general characteristics of watercourses
2. Geomorphology of streams
3. Stream hydrology and hydraulics
4. Ecohydrology of streams
5. Stream & floodplain ecology I
6. Stream & Floodplain Ecology – Water Quality and Health II
7. Arrangement of rivers and river valleys (Rosgen)
8. The pattern of streamflows
9. Floodplain formation
10. Modelling of aquatic structures
11. Watershed and river basin
12. Water flow in the floodplain
13. Summary and control questions
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| **Literature, handbooks**  |
| 1. The theoretical and practical material of the course is available in pdf and ppt format.
2. FISRWG (10/1998). Stream Corridor Restoration: Principles, Processes, and Practices. By the Federal Interagency Stream Restoration Working Group (FISRWG)(15 Federal agencies of the US gov't). GPO Item No. 0120-A; SuDocs No. A 57.6/2:EN3/PT.653. ISBN-0-934213-59-3.x
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| **Competencies gained** *(acc. to the Regulation on training and outcome requirements)* |
| 1. **Knowledge:**
* Provides the knowledge required to cultivate complex (water, environmental management) activities in the floodplain
* He/she is familiar with the basic agricultural, environmental, water management, nature conservation, modelling and engineering applications needed to manage the floodplain.
* He/she knows basic disaster prevention activities in the floodplain
* He/she is familiar with the technologies and procedures of managing, designing and operating natural and artificial wetlands
1. **Skills:**
* He/she is capable of sustainable management and protection of communities of floodplain forests and wetland habitats
* He/she is able to efficiently apply and develop environmental and ecological-engineering procedures in the field of floodplain
* He/she is able to process and control the agricultural, wetland habitat management activities conducted by ecological-engineering methods and to organize it.
1. **Attitude:**
* He/she takes into account the principles of environmental sustainability and economic efficiency
* He/she is committed to environmental protection and a sustainable agricultural economy.
* Collaborate with experts from other disciplines, accept differing opinions if they are technically well-supported.
* Long-life learning
1. **Autonomy and responsibility:**
* The students can decide independently how to implement the agricultural and environmental engineering technologies on the floodplain.
* He/she makes decisions with professional responsibility and takes the consequences.
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| **Responsible lecturer: Dr Pregun Csaba, assistant professor, PhD** |
| **Other lecturer(s): ………..., ………………….** |

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| **Terms of course completion:** |
| Completing assignments / exercises |
| **Form of examination:** |
| Written and/or verbal |
| **Requirement(s) to get signature:** |
| The implementation of the practices.You can only miss the practice in accordance with the University of Debrecen Study and Exam Regulations. Active participation in exercises.Calculation exam task. |
| **Exam questions:** |
| 1. Describe the water cycle!
2. Explain the following concepts: floodplain, flood, freshwater and river ecology, limnology!
3. Explain the following concepts: lentic & lotic systems, streams, rivers, floodplain, river corridor!
4. Explain the following concepts: Watershed, river corridor, stream restoration, watershed management, floodplain management, flood management!
5. Describe the main types of the wetlands!
6. Characterize the landforms and deposits of a floodplain.
7. Describe the important relationships between a stream and its floodplain!
8. Characterize the more common types of floods and floodplains!
9. Provide examples of Stream Corridor Functions!
10. Describe the natural and beneficial floodplain functions!
11. Characterize the natural flood and erosion control!
12. Characterize the biologic resources and functions of floodplains and river corridors!
13. Characterize the societal resources and functions of floodplains!
14. Describe the hydrologic and hydraulic processes of floodplains and river corridors!
15. Describe the geomorphic processes of floodplains and river corridors!
16. Describe the physical and chemical characteristics of floodplains and river corridors!
17. Describe the biological community characteristics of floodplains and river corridors!
18. Characterize the functions and dynamic equilibrium on river corridor!
19. Give details of the main concepts of the Rosgen River classification!
20. Characterize the Valley Morphology classification!
21. Describe the characteristics of channel cross-section, longitudinal profile, and planform features
22. Describe the River Continuum Concept!
23. Describe the Flood Pulse Concept!
24. Explain the Watershed drainage patterns are determined by topography and geologic structure!
25. Describe the sequence of pools and riffles in straight and sinuous streams.
26. What are the major chemical constituents of water?
27. What are some important relationships between physical habitat and key chemical parameters?
28. How are the chemical and physical parameters critical to the aquatic life in a stream corridor and floodplains?
29. What factors affect the channel cross section and channel profile?
30. How are water and sediment related?
31. Where does sediment come from and how is it transported downstream?
32. What is an equilibrium channel?
33. What are the major ecological functions of stream corridors?
34. How are these ecological functions maintained over time?
35. How do you incorporate all the spatial dimensions of the landscape into stream corridor restoration design?
36. What criteria can be applied to facilitate good design decisions for stream corridor restoration?
37. What are the major functions of soils in the stream corridor?
38. How are important soil characteristics, such as soil microfauna and soil salinity, accounted for in the design process?
39. What is the role of vegetative communities in stream corridor restoration?
40. What are some specific tools and techniques that can be used to ensure recovery of riparian and terrestrial habitat recovery?
41. When is stream channel reconstruction an appropriate restoration option?
42. How is a stream channel designed and reconstructed?
43. What are important factors to consider in the design of channel reconstruction (e.g., alignment and average slope, channel dimensions)?
44. Are there computer models that can assist with the design of channel reconstruction?
45. When should streambank stabilization be included in a restoration?
46. How do you determine the performance criteria for streambank treatment, including the methods and materials to be used?
47. What are some streambank stabilization techniques that can be considered for use?
48. What are the principal factors controlling the quality of instream habitat?
49. How do you determine if an instream habitat structure is needed, and what type of structure is most appropriate?
50. What procedures can be used to restore instream habitat? What are some examples of instream habitat structures?
51. What role does land use play in stream corridor degradation and restoration?
52. What design approaches can be used to address the impacts of various land uses (e.g., dams, agriculture, forestry, grazing, mining, recreation, urbanization)?
53. What are some disturbances that are often associated with specific land uses?
54. What restoration measures can be used to mitigate the impacts of various land uses?
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