(1.) Course Title: INFPHD643 Cognitive Data Visualization (complex exam preparatory)	**Credits: 6**
Course **Classification: Mandatory chosen**	
Theoretical or Practical Nature of the Course, *'training character'*[13]: practice (credit%)	
Type of Class: practice and **number of hours**: **2/week** in the given semester, *(If the course is not (only) taught in Hungarian, then **the language**: **English**)* **Additional** (specific**) methods and characteristics**[2] used in delivering the knowledge *(if any)*: -	
Assessment Method (Exam / Midterm Grade / **Other**[3]): practical course marc **Additional** (specific) **methods**[4] applied in knowledge assessment *(if any)*: -	
Course Placement in Curriculum (Semester Number): -	
Prerequisites (*if any*): -	

Course Description: **A concise yet informative description of the knowledge** to be acquired.

The complex exam covers the fundamental perceptual, cognitive, and affective psychological and neuropsychological processes underlying human visualization and their practical applications. Students are expected to demonstrate an understanding of how these processes influence the design and use of graphic visualizations as cognitive tools. Key topics include human vision and brain processes, memory, interaction, spatial reference frames, spatial orientation and navigation, and spatial cognition. The exam addresses the historical evolution and cultural traditions of graphic methods of data and information visualization. Students are required to know the main types of data visualizations, ranging from static graphs to interactive maps, network visualizations, and interactive dashboards, as well as the tools and softwares used to create them and their practical applications. Through practical examples, students explain graphical principles for visualization design in the context of user interfaces (UI) and uswer interaction (IxD) and review methods for analyzing user behavior (UX) and their application. They are expected to apply the acquired knowledge in IT research and development, with applications spanning scientific data analysis to industrial product development.

- Perceptual and Cognitive Foundations of Visualization
- Neuropsychological and Affective Influences
- Spatial Cognition and Navigation
- Historical Development of Visualization
- Types of DataVisualizations and its Graphic Methods
- Visualization Tools and Software
- Principles of User Interface (UI) and Interaction (IxD) Design
- User Experience (UX) research and Evaluation
- Application in Scientific Research
- Application in Industrial and Applied Contexts

2-5 Most Important Required and Recommended Literature
List of required and recommended literature (notes, textbooks) with bibliographic data (author, title, publication details, (possibly pages), ISBN).

- Colin Ware (2011): Information Visualization: Perception for Design. Interactive Technologies. Wiley, New York. ISBN: 1558608192
- Munzner, Tamara 2014: Visualiztaion, Analysis and Design. CRC Press, ISBN: 9781466508910
- Daniel Keim- Jörn Kohlhammer - Geoffrey Ellis Mansmann (2010): Mastering the Information Age. Solving Problems with Visual Analytics. Eurographics Association, Goslar. ISBN: 9783905673777
- Edward Tufte 2001: Envisioning information. Plenum Press, Boston, ISBN: 978-0961392116
- MacEachren, A.M. 2004: How Maps Work: Representation, Visualization and Design. New York: Guilford Press. ISBN: 0-89862-589-0

List of Prescribed Professional Competencies and Competency Elements

(knowledge, skills, etc., KKK Section 8) that the course significantly contributes to developing (highlight the most important ones).

a) Knowledge

- Has a research-level understanding of the general and specific characteristics, major directions, and precisely developed boundaries of the subject area within the discipline, as well as the agreed and debated interrelations.
- Creatively comprehends the interrelations, theories, and conceptual frameworks and terminologies of the given field of study.[1]
- Possesses research methodology knowledge necessary for independent research in the given discipline/field.

b) Skills

- Capable of creative analysis of the field, synthesizing comprehensive and specific interrelations with a new perspective, and conducting appropriate evaluative and critical activities.
- Able to apply and further develop the specialized learning and problem-solving methods of the field.

[1] **Section 108**, Article 37 of the National Curriculum Act (Nftv.) 37. lesson: a session (lecture, seminar, exercise, consultation) requiring the personal involvement of the instructor to fulfil the academic requirements specified in the curriculum, the duration of which is at least forty-five minutes and not more than sixty minutes.
[2] e.g. case studies, role play, thematic presentations, etc.
[3] e.g. continuous debriefing, mid-year report
[4] e.g. request for case studies, thematic papers, essays, business, organisational plans, etc.

- Can creatively elaborate on the novel, previously unknown practical implications of theoretical issues.
- Capable of planning and executing new projects, conducting research in the field, and developing new techniques and approaches.
- Able to identify unforeseen professional problems and uncover the detailed theoretical and practical background necessary for their resolution at a research level.
- Can construct and communicate new relations relevant to the field, as well as comprehensive interrelations significant for personal and communal existence.

c) Attitudes

- Represents and further develops the relations that contribute to the process of human self-creation based on the field's characteristics.
- Possesses an interest and learning ability that enable identifying and solving currently unpredictable research problems in the field.
- Demonstrates a firm professional commitment, a continuous dedication to exploring new approaches, and an acceptance of the necessity for persistent effort.

d) Autonomy and Responsibility

- Builds and initiates new knowledge areas with creative independence and proposes new practical solutions.
- Participates in formulating theoretical and practical questions with a leadership role and high-level cooperation.
- Engages as an equal discussion partner with professionals in the field.
- Takes responsibility for raising and addressing new ethical questions concerning theoretical and practical aspects of the profession.

Course responsible (name, position, academic degree): **Dr. Zsolt Török, associate professor, PhD**

Instructor(s) involved in teaching the course (if any) (name, position, academic degree):
-