UNIVERSITY NORTH, UNIVERSITY CENTRE VARAŽDIN, DEPARTMENT OF MULTIMEDIA

Graduate study program in Multimedia (Master program)

List of courses that can be delivered in English with learning outcomes

Interactive Media Design

1. Elaborate all aspects and technical parameters of the project and to be able to present them in different forms.
2. Distinguish and apply different methods and interpretations of visual-spatial phenomena and situations.
3. Analyse, compare and apply the technical-technological and syntactic-semantic aspects of the project.
4. Plan, select, apply and evaluate project solutions based on a wide range of media, procedures and methods

Colors in Multimedia Systems

1. To describe the operating principles of open and closed colour management (CM) systems.
2. To explain the role and types of profiles.
3. To understand the concepts and models of calibration and characterization.
4. To apply basic calibration and characterization procedures for additive and subtractive media.
5. To define concepts related to gamuts and gamut mapping and gamut conversion techniques.
6. To distinguish standard ICC rendering intents.

Production of Digital Photography 1

1. Students will be able to evaluate photographic production processes and the main characteristics of photography, from historical to contemporary practices.
2. Students will be able to explain and apply the technologies used in the production of complex photographic techniques.
3. Students will be able to use graphic and software tools for image processing.
4. Students will be able to independently manage and carry out complex photographic productions.
5. Students will be able to select and assess the quality of the best photographic solutions.
6. Students will be able to critically evaluate media content in media projects.

3D Modeling for Video Games

1. Explain the workflow from concept to the final 3D model intended for video games.repozitorij
2. Distinguish and apply different modelling methods depending on the complexity and form of the 3D model
3. Analyse and compare the visual appearance and level of complexity of finished 3D models.hrcak
4. Plan the activities required for the realisation of simple projects
5. Evaluate the work from the position of an author/professional

Communication in a Digital Environment

1. Interpret the most important theoretical insights from the field of communication in the digital environment.
2. Select research techniques appropriate to communication in the digital environment.
3. Apply research techniques appropriate to communication in the digital environment.
4. Plan and carry out a project task related to communication in the digital environment on the basis of one's own research.

Production of Digital Audio

1. Identify the sound design methods used and explain the reasons for using those particular methods in a project that contains an audio component.
2. Independently determine the importance of individual elements of the mix and independently set the mix elements in the process of audio production and post-production.
3. Introduce new creative sound design methods, developed through one's own research, into sound design processes.
4. Independently carry out the sound reinforcement of a demanding musical or music-theatre event.
5. Critically analyse and assess the value of one's own work, as well as the success of cooperation with other stakeholders in the completed project.
6. Plan, independently manage and carry out the entire process of audio production in one of the media (radio, film/video/TV, theatre, multimedia project), and to express oneself creatively in the medium of sound.

Web Design and Production

1. Students will be able to define the process of creating an advanced website.
2. Students will be able to explain the technologies used in the process of creating an advanced website.
3. Students will be able to explain concepts related to user experience design in the web environment.
4. Students will be able to apply graphic and software tools required for creating an advanced website.
5. Students will be able to independently plan, manage and carry out advanced web design tasks.
6. Students will be able to select and assess the best web design solutions.

Project Studio

1. Define the process of creating a project assignment.
2. Explain the technologies used in the process of creating a project assignment.
3. Explain concepts related to different ways of thinking.
4. Apply the tools required for creating a project assignment.
5. Independently plan, manage, and carry out project assignments.
6. Select and evaluate the best project assignments.

Digital Image Processing

1. Explain the creation of a digital image and the basic concepts related to a digital image.
2. Explain the Fourier and Z transforms.
3. Explain the basic concepts related to image compression.
4. Explain interpolation, image enhancement, and image quality.
5. Explain the wavelet transform.
6. Explain advanced methods for image analysis and understanding.

Production of Digital Photography 2

1. Students will be able to plan and prepare complex photographic projects and present them in multimedia systems.
2. Students will be able to successfully apply software tools for image processing and artificial intelligence programs.
3. Students will be able to distinguish and evaluate the quality of photographic production and artistic achievements through the typological orientation of creative practices.
4. Students will independently and in groups create a project assignment / artistic project aimed at product advertising

3D Animation for Video Games

1. Explain the techniques and the process of creating 3D animation intended for video games.
2. Differentiate and apply various animation methods depending on the type and purpose of the 3D model.
3. Analyze and compare the visual appearance and level of complexity of completed 3D animations.
4. Plan the activities required for the realization of simple projects.
5. Evaluate the work from the perspective of the author/professional.

Multimedia Video Technology

1. Master basic knowledge of image formats for transmitting TV content.
2. Become familiar with the basics of communication systems.
3. Become familiar with the basics of modulation.
4. Become familiar with the basics of antennas.
5. Become familiar with the basic standards for video compression.
6. Master basic knowledge of DVB-T/T2, DVB-S/S2, and IPTV systems.
7. Become familiar with mobile network standards.

Electronic Publishing

1. Understand the advantages and differences between electronic and print publishing.
2. Demonstrate advanced skills in using tools and techniques for graphic preparation and multi-page layout.
3. Understand and explain the procedures and methods of publishing electronic publications.
4. Identify and analyze issues related to the design–production relationship and propose solutions.
5. Know the possibilities of advanced PDF processing and its applications in e-publishing.
6. Understand the printing process within production workflow systems

Software tools for Digital Media

1. Independently create visually enriched content for publishing on the Internet and embed it into web pages using HTML technologies and CSS styling.
2. Use basic JavaScript to enhance interaction on web pages with embedded digital media.
3. Independently create static and dynamic multimedia files using various programming tools **and** visual programming tools.

Digital Video Production

1. List and explain the technical characteristics and describe the operation of: the lens, optical elements, image sensor, electronic processing and recording of video signals, microphone, audio input, electronic processing and recording of audio signals, and the battery of a television camera.
2. List, describe their use, and explain: the television camera control settings related to: the lens and lens accessories, viewfinder and control monitor (screen), television image parameters, video recording parameters, control of audio inputs and processing, and audio recording parameters.
3. Illustrate with examples the application of: selecting shot composition, choosing shot sizes, zooming within the frame, camera movement with stationary and moving subjects, working with focus and depth of field in the frame, and methods of selecting and positioning the microphone.
4. Identify, describe, and illustrate with examples: how to select television camera settings and operate the camera according to program (or authorial) requirements, shooting conditions, technical quality of the recorded image, and the artistic value of the image.
5. Demonstrate through practical work knowledge of the structure and rules for producing **content** such as short news items, features, reports, and commercials.

Innovative User Interfaces

1. Classify the structure and elements of user interfaces in interactive multimedia systems.
2. Evaluate existing user interfaces of interactive multimedia systems from the perspective of user experience.
3. Design simpler interfaces for interactive multimedia systems.
4. Apply innovative elements of user-centered design in interactive multimedia systems.
5. Assess the relationship between known and new innovative user interface metaphors.
6. Apply characteristic interaction styles to appropriate interactive multimedia systems.
7. Determine the requirements and role of advanced interactive multimedia systems and apply methods of predictive modeling and evaluation.
8. Implement the cognitive framework of human-computer interaction, including related mental and conceptual models.

Production of Video Games

1. Explain the structure of the process for creating 2D/3D video games.
2. Identify and fix errors in the code of a project assignment.
3. Analyze and compare the visual appearance and level of complexity of 2D/3D video games.
4. Plan the activities required to complete simple projects (2D/3D video games).
5. Evaluate work from the perspective of an author/professional.

Computer Vision

1. Explain concepts related to image processing: filtering, multiresolution transformations.
2. Explain concepts related to image analysis: image features, edge detection, image segmentation, texture synthesis.
3. Explain the creation of 3D content and generation of virtual views: point clouds, light fields, and holography.
4. Explain basic concepts of machine learning and algorithms: object classification, object detection, semantic segmentation, and instance segmentation.
5. Explain the application of computer vision in various applications.
6. Explain different types of neural networks: FNN (Feedforward Neural Network), CNN (Convolutional Neural Network), RNN (Recurrent Neural Network), Transformer.
7. Simultaneous Localization and Mapping (SLAM), visual SLAM.
8. Introduction to natural language processing (NLP) and more complex deep learning models

Virtual and Augmented Reality

1. Define the concept of a virtual environment.
2. Identify and explain the difference between virtual reality (VR) and augmented reality (AR).
3. Analyze existing solutions for the application of advanced virtual environments.
4. Plan the activities required to develop a 3D application based on virtual and augmented reality.
5. Evaluate work from the perspective of an author/professional.

Mobile Applications

1. Understand the basics of working with the Node.js platform, which serves as the foundation for most development frameworks.
2. Improve interaction on websites in mobile applications by applying specific mobile JavaScript frameworks, including access to local resources on mobile devices.
3. Independently create simple mobile applications using general HTML5 web technologies and popular JavaScript mobile development frameworks.
4. Enable communication between mobile applications and remote servers using AJAX.

3D Printing

1. Evaluate the basic principle of additive manufacturing.
2. Compare the main 3D printing techniques, explain individual technologies, identify situations where 3D printing can successfully replace traditional manufacturing methods, and select the optimal 3D printing technique.
3. Assess the complete process of creating a 3D model, from concept to final product, and identify the appropriate technology for producing specific 3D models.
4. Recommend suitable materials to achieve satisfactory mechanical and visual properties, recognize the impact of material anisotropy on the model, and accordingly adjust the 3D printing process.
5. Ensure proper preparation of models for 3D printing and successfully operate a consumer **FDM** 3D printer.

Production and Distribution of Audio-Video Content

1. List, compare, and explain video and audio compression formats.
2. List, compare, and explain carriers, media, and technologies for storing and distributing video.
3. Describe the characteristics and operation of networks for linear television distribution.
4. Differentiate, compare, and explain networks and systems for nonlinear distribution of audio-video content.
5. List, differentiate, and explain content protection systems.
6. List and differentiate services on the market according to the technology used for production and distribution of audio-video content.

Project Studio 2

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3. Explain concepts related to different ways of thinking.
4. Apply the tools required for creating an advanced project assignment.
5. Independently plan, manage, and execute advanced project assignments.
6. Select and evaluate the best project assignments.