INFORMATION PACKAGE FOR GRADUATE STUDY OF GRAPHIC ENGINEERING

Name of the course: Digital printing

Teacher: assoc. prof. PhD. Igor Majnarić

Associate teachers:

Lectures (L): assoc. prof. PhD. Igor Majnarić

Seminar (S):-

Laboratory (LAB):assoc. prof. PhD. Igor Majnarić

Type of instructions (L- lectures; S- seminars; LAB -laboratory): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2

ECTS credits: 6

Study programme: Graduate Status of the course: Mandatory

Semester: Winter Semester number: I

Possibility of teaching in English: Only for foreign students

Course objectives: Students deepen the theoretical foundations based on Computer to Press and Computer to Print technologies. All relevant NIP printing technologies will be analyzed in more detail, including their basic working principles. They learn about the design features of digital printing machines that can print from rolls and sheets, whose role is crucial for creating a quality print. During the course, problems caused by the interaction of printing substrates, printing inks (toners), and other factors that can be found in the working environment (digital printing press) are identified. During the class, students will create computer templates and print prints using different digital techniques, after which they will compare them with each other, applying various measurement methods to evaluate the quality of reproduction. The evaluation will be performed using advanced methods of image analysis, with a standard comparison based on densitometric, colorimetric and spectrophotometric measurement methods.

Prerequisite for enrolling in the course: Knowledge and understanding of the operation of conventional printing machines and the characteristics of prints created on them (Main and small printing techniques). Knowledge and understanding of the basics of densitometric and colorimetric measurement methods (Colorimetry or offset printing).

Prerequisite for taking the course exam: exercises completed and colloquiated

General And Specific Competence and learning outcomes of the course:
Students will be able to list all digital printing techniques and determine their direct application with regard to productivity and print quality. After passing the course, students will be able to explain in detail all construction variants of digital printing machines (Electrography, Inkjet, Magnetography, Ionography, Electrography, Photography,

Thermography, X-graphy) together with the basic processes that take place during the generation of a print. This alone will allow for quantitative and qualitative evaluation. For the two most dominant digital printing techniques (Inkjet and Electrophotography), students will be able to prepare hand-made digital files, and print them with the desired adjustment of adequate settings on the printer (using linearization and appropriate ICC profiles). For the needs of digital printing, students will be able to critically select adequate consumables (printing substrates and inks) and in accordance with them in order to achieve adequate print quality. On the basis of theory and practice obtained during lectures and exercises (performed by densitometric and colorimetric measurements), the student will be able to independently evaluate conventionally printed and digitally printed prints and assess which of them is more applicable for the realization of different graphic products.

Course content (Syllabus) on a weekly basis:

1. Introductory lecture (def. rights and responsibilities of students, def. seminars in Digital Printing, def. literature). Introductory exercise (def. rights and duties of students, def. necessary equipment and literature)

2. Digital printing systems, the difference between individual and mass. Personalization and printing on the claim. Presentation of Non-Impact Printing (NIP) technologies, Applications in digital printing, and development trends. (0.25 ECTS)

   Creating your one-page digital product in the Adobe Illustrator application (print 4/0). Production of P.S. file, creating a PDF file suitable for digital printing on known machines (known PPD and precisely defined driver) (0.25 ECTS)

3. Part I: basics of the electrostatic process. Photosensitive materials and properties of photoconductors. Powder and liquid toners. Chronological development of EP. printing machines. Stages of formation of black and white EPs. of imprints Drum photoreceptor impingement processes. (0.25 ECTS)

   Creating your own double-sided printed digital product in the Adobe Illustrator application (print 4/4). Production of P.S. file, which is printed in margo, creation of a PDF file suitable for digital printing on an HP Indigo machine (known PPD and precisely defined driver) (0.25 ECTS)

4. II. part: the basis of the electrophotographic process. Lighting modes ROS and LED. Principle of laser operation. Modulation of laser radiation. Laser beam directors. The principle of image formation in photocopiers. (0.25 ECTS)

   Presentation of the creation of digital products in Adobe Acrobat applications with the help of a plug-in for digital imposition (standard book sheets and non-standard book sheets). Printing examples on the Laserjet 9050 dn printer, defining sheet rotation, activation of digital finishing. (0.25 ECTS)

5. III. part: The the basis of the electrophotographic process. Principles of development in electrophotographic machines. Principles of possible transfers in electrophotography. (0.25 ECTS)

   Creating your multi-page digital product in Adobe Acrobat applications with the help of a plug-in for digital imposition (standard book sheets and non-standard book sheets) (0.25 ECTS)

6. III. part: The the basis of the electrostatic process.

   Principles of fusion of electrophotographic prints. Fusing with rollers, non-contact fusing, fusing with solvents. Principles of photoreceptor cleaning. (0.25 ECTS)

   Creating your digital product that contains special effects. Generating files for automatic cutting, Generating special spot colors, Activation of achromatic and metallic colors, and Generating files for in-line varnishing (segment varnishing and varnishing of certain samples). Creation of files for personalized printing. (0.25 ECTS)

7. Constructions of multi-colored EPs. machines. Transport systems for guiding paper. Finishing options for electrophotographic machines. Possible special effects (0.25 ECTS)

8. COLLOQUIUM

   Description of the basic structure of the HP Indigo printing machine. Disassembly of basic machine components, description of their structure and purpose. (0.25 ECTS)

9. Working principle of the ionographic printing process. Ionographic machine constructions. Postulates of magnetism, the principle of magnetography, construction of magnetographic machines (0.25 ECTS) Adjustment of the coloring system, and carrying out the calibration procedure of the machine. Paper transport adjustment and duplex unit adjustment. (0.25 ECTS)

10. Principle of operation of electrographic printing machines. Principle of operation of thermographic machines. The working principle of photographic machines. Types of printing substrates for photographic printing. (0.25 ECTS)

    Working with HP Indigo RIP. Sending performed files to RIP. Adjustment of separations, printing, and correction of prints (colors, positions). (0.25 ECTS)

11. Principle of formation of droplets. Continuous InkJet printing. Principle and operation of binary InkJet printing. The principle and operation of guided IRIS printing. Working principle of thermal Inkjet, Variants of construction of the basic cell and tank. Achieving photo quality printing. (0.25 ECTS)

    Test printing in the Inkjet technique. Performing linearization within color management software (EFI RiP). Generating the ICC profile of the production footprint. Test printing with the application of the desired profile. (0.25 ECTS)

12. The working principle of piezoelectric InkJet printing. Variants of the structure of the basic cell. Principle of operation of the Electrostatic InkJet. Cell structure. Achieving higher resolution in print. Ultrasonic Inkjet. Dyes for InkJet printing techniques. Printing mats. (0.25 ECTS)

    Presentation of basic machine components of UV LED Inkjet, description of their structure and purpose. Working with Roland's RIP. Printing specially created files. (Cutting and printing, varnishing, spot color, and white color printing) (0.25 ECTS)

13. Working principle of X-graphic printing systems. Direct imaging, Electrography, TonerJet printing, Nanography. The working principle of hybrid digital printing. (0.25 ECTS)

    Making a print using the principle of indirect thermal transfer. Preparation of the transfer medium and its transfer to the shirt. Creating a doom effect as a possibility to create a special relief pattern. (0.25 ECTS)

14. Machines for digital printing with permanent printing form. The principle of creating a permanent form with a laser in offset printing machines. Construction of digital machines with permanent printing form. Satellite machines based on Computer to Press technology. Changing the shape without removing it from the machine. Tandem Computer to Press machines. Change of printing form. Dyes and printing media. Other Computer to Press printing technologies. (0.25 ECTS)

    Visit (excursion) a Croatian digital printing house.

15. COLLOQUIUM

    Basics of Prinergy EVO workflow:

    Setting options for rasters within Adobe Acrobat software (setting the line, shape, and size of raster elements), defining trapping separations and editing them, and comparing content within pdf documents. (0.25 ECTS)

    Presentation of all the possibilities of generating a multi-page digital product in Adobe Acrobat applications with the help of a plug-in for digital imposition. Display of PDF file corrections and its two-sided printing on CB electrophotographic printer HP 9020 dn. (0.25 ECTS)

Format of instructions:

lectures ☒	laboratory ☒	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☒	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☒	test report ☐	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☒

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☒ Multiple choice tasks

☐ Alternative choice tasks ☐ Connecting and arranging tasks

☐ Problem solving tasks

Other:-

Assessment and evaluation of students' work during classes and on the final exam:

Normative assessment (examination is longer and larger units, tasks, and average weights are examined).

Other: -

Teaching process evaluation: Monitoring one's work (teaching process evaluation):

Student evaluation (survey) ☒

Other:

Refrences

Required:

B. Baumler, C. Senff, Laserdruck, Polygraph Verlag GmBH, Frankfurt am Main, 1988. G. A. Nathmann, Nonimpact Printing, Graphic Arts Technical Fundation, Pittsburgh, 1989. F. J. Romano, H. M. Feuton, On Demand Printing, Graphic Arts, Technical Fundation, Pittsburgh,1998. H. Kipphan et al., Handbook of Print Media, Springer, Berlin, 2001. G. Goldman, The World of Printers, Piong, OCE Printing Systems, 2004. I. Manarić, Studija indirektne elektrofotografije, Grafički fakultet Zagreb, 2007.

Optional: -

Name of the course: Holography

Teacher: assoc. prof. PhD. Damir Modrić

Associate teachers:

Lectures (L): Damir Modrić

Seminar (S):Damir Modrić

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+0

ECTS credits: 5

Study programme: Graduate Status of the course: Mandatory

Semester: Winter Semester number: I

Possibility of teaching in English: Yes

Course objectives:The aim of the course is to acquire fundamental and specialized knowledge in holography and it's implementations in graphic technology.

Enrollment requirements: /

Prerequisite for taking the course exam: /

General And Specific Competence and learning outcomes of the course:
The aim of the course is to acquire fundamental and specialized knowledge for implementation of holography in graphic technology. Students will be able to define the basic physical principles that must be followed in the design, production, and application of holograms. Identify the basic physical assumptions related to the relationships between the finished graphic product, printing technology, design solutions, and holograms. Recognize the potential applications of holograms in graphic technology. Identify different possibilities for realizing holograms within a graphic product with respect to different design solutions. Identify the optimal method for producing holograms used in the graphic industry. Recognize different types of holograms and their specific applications in graphic technology. Select optimal solutions for designing holograms as a graphic product. Define and apply protective elements of holograms and the level of protection required for a specific graphic product. Acquire basic knowledge for creating computer-generated holograms.

Course content (Syllabus) on a weekly basis:

1. Introduction

    - History of holography

• Three-dimensional image. Wave front and its reconstruction. Application of holography. Waves and light, "phase imprints" of wavefronts

• principles of holography

• Applications and types of holograms

• Properties of holograms

• Holographic interferograms

• Commercial use

• Protective holograms

• Holography in art

0.25ECTS

2. Coherent Light Optics I

- Wave nature of light
- Diffraction and interference
- Coherent and incoherent light
- Laser
- Wave fronts
- Huygens' principle
    - Huygens' principle and the law of refraction
- Diffraction
- Interference - Young's experiment
- Young's experiment with two slits:
    - Intensity distribution
- Interference of two beams of light
- Geometry of interference. Diffraction on slits and gratings. Spatial frequencies.
- Constructive or destructive interference
- Coherent or incoherent interference
- Irradiance (intensity) of light waves - relative phase.

0.34 ECTS

3. Coherent Light Optics II

• Light scattering

• Diffraction gratings

o Diffraction orders

- Holographic ray tracing. Focusing using so-called Fresnel lenses (Fresnel pattern)
- Comparisons with conventional optics (prisms and lenses).
- Conventional vs. holographic photography o Stereogram (an example of what is not a hologram)
- Point source hologram
    - o Construction of a point object hologram: intensity distribution on a plate
- Hologram and its reconstruction
- Direct, object, and conjugate waves
- Orthoscopic vs. pseudoscopic images.
- Hologram – reflection vs. transmission
- Wavefront and radiation source
- Interference and fringes 0.34 ECTS

4. Simple transmission holograms I

- Types of holograms
    - o Transmission holograms
    - o Reflection holograms for white light
    - o Holograms with multiple images
    - o Multiplex holograms
- Requirements for recording holograms
- Lasers, vibration-isolated tables, optical hardware, recording material, and its processing
- Optical elements in holography
    - o Lenses, mirrors, and gratings
    - o Beam splitters
    - o Spatial filters
    - o Gray wedges

- Lasers

- Viewing transmission holograms

- Interference fringes during the recording of a point object hologram

- Reconstruction of holograms

- In-line (Gábor) holograms. Off-axes (Leith & Upatnieks) holograms.

- Beam ratio and diffraction efficiency. Astigmatic focusing.

    - Point source hologram (Gabor) and its description by wave interference (description with complex number formalism)

    - Off-axis (Leith, Upatnieks) hologram and its description by wave interference.

0.34 ECTS

5. Simple transmission holograms II

- Reflection holograms

- Denisyuk holograms

- Thin and volume holograms

- Practical, experimental issues of high diffraction efficiency holograms and their reconstruction.

0.34 ECTS

6. White-Light Transmission Holograms

- Sources of image blurring

- Image-plane holograms

    - Projection of a real image by phase conjugation

- Rainbow holograms

    - Multicolored rainbow holograms

    - Recording, reconstruction, and transfer

    - Advantages of rainbow holograms

- Contact copying of transmission or reflection holograms
- Direct laser writing (engraving)
- Processes for preparing photoresist for lithography.

0.34 ECTS

7. Reflective holograms
    - Experimental setup for single-beam holography
        - Matching the refractive index of holographic films
        - Setup without refractive index matching
        - Polarization and Brewster's angle
        - Intensity loss in setup with Brewster's angle
    - In-line (Denisyuk) hologram
    - Off-axis reflective hologram
    - Full-color holography.

    0.34 ECTS

8. Synthetic and computer-generated holograms
    - Computer-generated holograms (CGH)
    - Application of CGH as a security printing element
    - Methods for encoding and recording holograms
    - Basic steps in the synthesis of CGH (computer-generated holograms)
        - Find a mathematical model that describes the object or scene of interest
        - Calculate the hologram (or amplitude and phase distribution)
        - Encoding - transforming the "mathematical" hologram into a physical one
        - Recording the hologram on a physical medium

    0.34 ECTS

9. Holographic interferometry
    - Double-exposure interferometry

        - Theoretical foundations
        - Practical realization
        - Sandwich method
    - Intensity of interferograms
    - Real-time holographic interferometry as a quantitative measurement technique for objects undergoing deformation
    - Time-averaged holographic interferometry as a quantitative measurement technique for vibrating objects.

    0.34 ECTS

10. Holographic materials
    - Requirements for holographic materials:
        - Excellent optical quality
        - High dynamic range
        - High sensitivity
        - Stability
    - Materials used
    - Overview of materials used in holography
        - Silver halide
        - Dichromated gelatin
        - Photoresist
        - Photopolymer for recording phase holograms
        - Ferroelectrics
        - Thermoplastics
    - Properties of holographic emulsions
        - Transmission and phase curves
        - Optical density
        - Modulation
        - Bleaching
    - Optical properties
    - Resolution and diffraction efficiency
    - Emulsion noise
    - Emulsion shrinkage
    - Pseudo-coloring, pre-swelling
    - Index matching

    0.34 ECTS

11. Hologram printing I
    - Mass production of holograms
    - Hologram printing techniques

- Making a master hologram
    - Holographic materials for making the printing form (holographic hot stamping foils)
    - Electroforming
    - Embossing (thermo printing)
    - Printing substrates
    - Embossing transparent PET film
    - Properties of embossed holograms
    - Metallization
    - Electron beam lithography
- Hologram printing using foil stamping
    - Printing systems
- Hologram printing using flexography
    - Cold Pressing Hologram
- Digital hologram printing
    - Concept of holopixels
- Holographic security devices in industry (Counterfeiting)
- Counterfeiting procedures and countermeasures.

0.34 ECTS

12. Printing holograms II

• Holoprinters o MPGH holoprinters (Multiple Photo Generated Hologram)

o DOT-MATRIX holoprinters

o DIGITAL FULL-COLOR holoprinters

o OFFICE holoprinters

• Holographic electronic display

o Setup for electro-optical recording and reconstruction of digital holograms

• Electron-beam lithography

- Photolithography
- Ion beam etching

0.34 ECTS

13. Holography and information technologies
    - Pattern recognition
    - Image Processing
    - Neuro computers
    - Information recognition
    - Phase conjugate mirrors
    - Digital holographic memories
    - Microholographic DVD

    0.34 ECTS
14. Holographic Imaging technology
    - Holographic stereograms. Holographic video. Holographic projections.
        - o Comparison of video and holo projectors
        - o Stereoscopy
        - o Stereoscopic techniques with accessories on monitors
        - o Holography – Zebra imaging

    0.34 ECTS
15. Art and Holography
    - 3D viewing. Composition principles of holography. Historical and regional style analyses. Question of format.
    - Portrait holography
        - o Lasers for pulsed portrait holography
        - o Master (H1) and reflection copy (H2)
        - o Calculations for Eye Safety o Multiplexing method

• Commercial holograms

• Holography in "the seventh art"

• Handmade holography

0.34 ECTS

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☒	test report ☐	oral exam ☒	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☒ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Kliknite ili dodirnite ovdje da biste unijeli tekst.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☒

Other: Assessment and evaluation of students' work during classes and on the final exam: seminars: independent solving of numerical problems; final exam: written part of the exam (solving numerical problems), oral part of the exam (theory)

Refrences

Required: 1 HOLOGRAPHIC IMAGING: Stephen A. Benton, V. Michael Bove, Jr., John Wiley & Sons, Inc., Hoboken, New Jersey, 2008 2. PRACTICAL HOLOGRAPHY, Third Edition, Graham Saxby, IOP Publishing Ltd., 2004

Optional: 1. Ronald W. Waynant: ELECTRO-OPTICS HANDBOOK 2nd ed. , The McGraw-Hill, 2000, 2. HOLOGRAMS & HOLOGRAPHY: DESIGN, TECHNIQUES, & COMMERCIAL APPLICATIONS, Vacca, John R., CHARLES RIVER MEDIA, INC. Hingham, Massachusetts, 2001, 3. HOLOGRAPHY: A PRACTICAL APPROACH, Gerhard K. Ackermann, Jürgen Eichler, WILEY-VCH Verlag GmbH & Co. KGaA; Weinheim, 2007

Name of the course: Bookbinding 2

Teacher: assoc. prof. PhD. Suzana Pasanec Preprotić

Associate teachers:

Lectures (L): -

Seminar (S):-

Laboratory (LAB):senior researcher PhD. Gorana Petković

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2L+2LAB

ECTS credits: 6

Study programme: Graduate Status of the course: Elective

Semester: Winter Semester number: I

Possibility of teaching in English: Yes

Course objectives: The goal of the course is for students to learn to critically judge the effectiveness of bookkeeping activities in craftsmanship and process-oriented functional organizational structures (small, medium, and large companies). Students should be able to distinguish manual from publisher's binding, be able to analyse and propose actions and processes that will be in the function of harmonizing the production trinomial: quality - time - money, which means binding the required quantity of books in a quality manner at a market-acceptable price and the desired deadline deliveries. Students will learn to recommend and define activities and actions that result by converting input materials (raw materials, semi-finished products) into a finished product, but it will also recommend means of work (bookkeeping machines, devices) and personnel on which and with whom they are carried out activities from the storage of input materials to the storage of finished bookbinding products. That way it will students come to know how to achieve the maximum business effect with the smallest share of work and means of work. It is expected that after following this course, students will be able to in real life situation, choose a suitable production process conditioned by the characteristics of the bookbinding product. Student will represent those opinions that will be in the function of economical bookbinding production, management costs and competitiveness. It is expected that experiential learning (case studies, games, work on projects) to significantly contribute to synthesizing the overall knowledge from the subjects that the students studied at undergraduate university study of graphic technology (Handbook binding, Bookkeeping, Organization of graphic production, Automation, and maintenance of graphic machines). That way it will students directly develop professional competence to solve problems through work in the field continue, exclusively in the bookbinding activity. Students will use this way of working creatively existing knowledge and implement known parts into a new whole. Because of various activities (problem assignment) in the field lesson,

students will develop social skills through interaction with staff from business. It will also develop independence by introducing various activities in unpredictable environmental conditions and this will have an impact on their social and ethical responsibility.

Enrollment requirements: Students should listen to Book Binding, Bookkeeping, Organization graphic production and automation and maintenance of graphic machines. The students' entry competences that are required for this course are: Identify contemporary binding forms and theirs subspecies with secondary differences; Knowledge and harmonization of technical, aesthetic and material principles when creating a book; Identify the machines in the bookbindery and implement them within technological units; Design a specific technological scheme for the binding of a bookbinding product (classification of books according to purpose); Recognize the total technological resources that should be in function of the quality of the final product products (paper, glue); Evaluate the technical-technological process of a certain type of bookbinding products (block, catalogue, monograph, picture book,...) on a real example; Distinguish functional organizational structures with regard to the number of functional units; Interpret the meaning of the function production with the participation of labour, objects of labour and means of labour; Interpret how business is realized effect; Demonstrate the primary differences between work preparation and technological work preparation; Recognize degree of automaticity of the bookbinding machine; Propose an optimal model of technological automation units of a certain type of binding; Criticism and self-criticism of students in order to through experiential learning developed their interpersonal skills, independence and responsibility.

Prerequisite for taking the course exam: completed lectures, exercises and personal seminar work.

General And Specific Competence and learning outcomes of the course:
Formulating and systematizing problems in graphic technology, and defining their hierarchy solutions; Planning of research methodology in solving set tasks; Preparation of complex project tasks of creating a graphic product in accordance with resources; Proposing new i functional solutions of graphic products with regard to materials and processes; Valorisation of elements individual phases of the implementation of the plan.

Course content (Syllabus) on a weekly basis:

1. Introductory lecture (definition of rights and duties of students, definition of literature) and introduction in the complexity of the organization of bookbinding production, in general, which affects efficiency bindery activities (0.09ECTS). Introductory exercise (defining the rights and duties of students); checking the learning outcomes of students (classification of books, design of various technological units regarding circulation, type, binding form, designing technological product schemes (block, educational picture book, monograph, ...); collaborative learning in small groups (project assignments on real examples), (0.16ECTS).

2. Defining operational work preparation (activities: annual and operational planning); guidance state of material resources (storage of raw materials and finished bookbinding products); ranking of employee competencies according to importance depending on the way production is carried out (manual, publishing: machine, linear); case analysis-creating mental maps (collaborative learning in small groups), (0.18ECTS). Students create an operational work preparation based on the acquired experience in the economy (student practice), they solve realistic cases from the bookkeeping industry for three different one's types of production (individual, serial, mass); case analysis-students in small groups they discuss, make joint decisions, develop independent opinions, and respect others' opinions (0.13ECTS)

3. The presentation of the work (Power Point) of each group of students lasts about thirty minutes. The project of operational preparation of work for three types of production is submitted in a completed form mental maps of a group of students with the presentation of a production schedule and collected technological documentation (0.16ECTS). Analysing students' work, thus forcing students to think, evaluate and revise their projects, encourages students to immerse themselves in the characters and problem in the case. (0.20ECTS).

4. Planning of operational accounting production (activities: optimization, capacity planning, creation of work documentation, monitoring of production); ranking of employee competencies according to importance depending on the method of production (manual, publishing: machine, line); case analysis-creating mental maps (collaborative learning in small groups), (0.40ECTS). Students independently create work orders that physically follow bookbinding production processes. On the basis of the acquired experience in the economy (student practice), they solve realistic one's cases from bookkeeping for three different types of production (individual, serial, mass); case analysis - students discuss in small groups, make joint decisions, they develop independent opinions and respect different opinions (0.13ECTS).

5. The presentation of the work (Power Point) of each group of students lasts about thirty minutes. Project on how to plan optimal bookbinding production for three different types (individual, serial, mass) is taught in the form of a created mental map of the group students with the presentation of the necessary documentation (work orders, bookbinding specification of machines), (0.16ECTS). Analysis of students' works, in this way students are forced to think and evaluate revise their projects, encourages students to immerse themselves in the characters and problem in the case (0.20ECTS).

6. Designing technical-technological units for three different types of bookbinding production and organization of internal transport (horizontal, vertical) taking into account greater utilization and compliance of capacities (machines, materials, employees); case analysis-making mental map (collaborative learning in small groups), (0.40ECTS). Students independently create production plants by following the accounting production processes. On the basis of the acquired experience in the

economy (student internship), they solve realistic cases from bookkeeping activities for three different types of production (individual, serial, mass); case analysis - students discuss in small groups, make joint decisions, develop independent opinions and respect different opinions (0.13ECTS).

7. The presentation of the work (Power Point) of each group of students lasts about thirty minutes. Projects of technical and technological units for three different types (individual, serial, mass) it is delivered in the form of a created mental map of a group of students with the presentation of the necessary documentation (work orders, specification of bookbinding machines with structural solutions, systematization of workplaces, materials, and transport routes), (0.16ECTS). Analysis of students' works, in this way students are forced to think and evaluate revise their projects, encourages students to immerse themselves in the characters and problem in the case (0.20ECTS).

8. Design of a work order with standardization of the number and sequence of work operations, workplaces, methods of work, working conditions, consumption of working time, quantity of materials, objects of work and means of work; case analysis-creating mental maps (collaborative learning in small groups), (0.40ECTS) Students independently create production plants by implementing the work, the subject of the work and means of work. Based on the acquired experience in the economy (student internship), they solve realistic cases from bookkeeping for three different types of production (individual, serial, mass); case analysis - students discuss in small groups, come up with common ones decisions, develop independent opinions and respect different opinions (0.13ECTS).

9. The presentation of the work (Power Point) of each group of students lasts about thirty minutes. Projects of technical and technological units for three different types (individual, serial, mass) it is delivered in the form of a created mental map of a group of students with the presentation of the necessary documentation (systematization of jobs, subjects of work and means of work), (0.16ECTS). Analysis of students' works, in this way students are forced to think and evaluate revise their projects, encourages students to immerse themselves in the characters and problem in the case (0.20ECTS).

10. Business excellence as an element of business success (factors: internal, external). Analysis external factors: competition, suppliers, micro/macro aspects, tax regulations. Analysis of internal factors: human resources, management of emotions (social-emotional employee competencies); case analysis-creating mental maps (collaborative learning in small to groups), (0.18ECTS). Students independently create a business taking care of interpersonal relationships, with the goal achievement of mutual satisfaction (entrepreneur/manager and employee). Production which should be based on the trust and motivation of employees (positive working atmosphere), engagement of the employer in achieving greater business excellence (self-awareness, self-control, motivation, empathy, social skills). Based

on the experience gained in the economy (student practice) solve realistic cases from bookkeeping for three different types production (individual, serial, mass); case analysis-students in small groups they discuss, make joint decisions, develop independent opinions and respect others opinions (0.13ECTS).

11. The presentation of the work (Power Point) of each group of students lasts about thirty minutes. Business excellence in bookbinding production (individual, serial, mass production) is taught in the form of a created mental map of a group of students along with the systematization of the offered solutions motivate employees according to the model of five basic emotional and social competencies (0.16ECTS). Analysis of students' works, in this way students are forced to think and evaluate revise their projects, encourages students to immerse themselves in the characters and problem in the case (0.20ECTS).

12. Independent creation of a project task (reconstruction of a real life situation) by each student individually; are valued and evaluated for the realization of the solved problem (engineering and emotional social competence) (0.7ECTS).

13. Presentation of the work (Power Point) of each individual student in the duration of 15 minutes (0.16ECTS). Analysis of students' works in this way, students are forced to think and evaluate revise the projects of their colleagues, encourages students to immerse themselves in the characters and the problem case study (0.20ECTS).

14. Presentation of the work (Power Point) of each individual student in the duration of 15minutes (0.16ECTS). Analysis of students' works in this way, students are forced to think and evaluate revise the projects of their colleagues, encourages students to immerse themselves in the characters and the problem in case study (0.20ECTS).

15. Grading according to the created rubric (grading criteria); evaluation of the teaching process (survey by students), (0.16ECTS). Grading according to the created rubric (criterion for grading); evaluation of the teaching process (survey by students), (0.16ECTS).

Format of instructions:

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☐	field work ☒
exercises on computers ☐	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☒	practical work ☒
activities in class ☒	test report ☐	oral exam ☐	portfolio ☐

seminar work ☐ experimental work ☐ continuous knowledge examination ☒

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☒ Guessing and completion tasks ☒ Multiple choice tasks

☒ Alternative choice tasks ☒ Connecting and arranging tasks

☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Self-evaluation (participation of students in evaluation)

Other: Colloquium (exercises) - evaluation of problem-solving and decision-making skills (individual)/Study case Colloquy (lecture) - evaluation of problem-solving and decision-making skills (in a working group up to 5 students)-Mental map/Case study

Teaching process evaluation: Evaluation by students (Survey)

Student evaluation (survey) ☐

Other: Creation of rubrics in which evaluation criteria are determined (scale of 1 - 4)

Refrences

Required: Čovo, Održivo poduzetništvo, Sveučilište u Zadru, Zadar, 2007.
J. Primožić, Tehnološki priručnik za grafičare, Školska knjiga, Zagreb, 1997.
H. Kipphan, Handbook of Print Media: Print finishing processes, Springer, Berlin, 2001.
Nastavni materijali na webu Katedre za knjigoveštvo i ambalažu, link:
http://dorada.grf.unizg.hr/pages/kolegiji/knjigovestvo-2/nastavni-materijali.php
T. Mikac, D. Blažević, Planiranje i upravljanje proizvodnjom, Tehnički fakultet- Zavod za industrijsko inženjerstvo i management, Rijeka, 2007.
B. Juri, Osnove planiranja i organizacije grafičke proizvodnje, Acta Graphica, Zagreb, 2001.

Optional: http://www.fsb.unizg.hr/usb_frontend/files/1359365425-0-tehnolokapripremaproizvodnje_5_6_2012_2013.pdf (24.2.2014.)
http://proizvodnisistemi.com/pdf/primeri/grid/master_rad.pdf (24.2.2014.)

Name of the course: Multimedia communications 2

Teacher: Associate Professor Ivana Žiljak Stanimirović, Ph.D.

Associate teachers:

Laboratory (LAB): Marko Maričević, mag.ing.graph.tech.; Željko Bosančić, mag.ing.graph.tech..

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L; LAB

Type of instructions presented as number of hours L +LAB on a weekly basis: 2+2
Lectures (30 hours), laboratory exercises (30 hours)

ECTS credits: 6.0

Study programme: Graduate Study

Status of the course: Mandatory / Elective

Semester: Winter Semester number: I

Possibility of teaching in English: for foreign students

Course objectives:
Knowledge of advanced multimedia communications and technologies, interactive "rich media", communication via the Internet and communication on the cloud. Developing 3D animation of a graphic product for presentation in multimedia environments. Designing and generating individualized multimedia coded information and communication through applications, "near field" communication and communication in augmented reality. The course deals with advanced multimedia communications and technologies, interactive "rich media". Programming of multimedia elements of text, image, sound, video and interactive form as the highest level of multimedia. An overview of the development of multimedia from the "desktop publishing" revolution to the "post pc" period is given. New technological achievements are analyzed in order to plan the future of multimedia and design advanced multimedia communications, apps and innovations. Share of multimedia in communication via the Internet. Internet development, HTML5 and the future of application development. The future of mobile multimedia devices. New generation of services for creativity, production. Adobe "touch" applications for designing multimedia content on tablets. Individualization of sound through action script, connection with computer graphics and installation in HTML5 language. Designing 3D animation of graphic products such as packaging, interactive 3D book for presentation in multimedia environments, publishing on the web. Connecting multimedia content on the cloud, Adobe "creative cloud". Coded multimedia content, coded marking of graphic products, coded communication. Generation and design of individualized 2D codes, QR codes and labels for advanced multimedia communication. Implementation of coded information in conventional graphic product, business documentation and packaging for direct connection to cloud databases. Barcode

readers and infrared cameras for automatic controls and cash registers, verification of coded information. Work with optical readers and applications I-nigma, Neo Reader, Microsoft Tag, Custom Tag. Communication in augmented reality, visual - near IR area. Codes in NIR and "Near field" communication. Communicating via the cloud, Google glass and multimedia communication at speed and at eye level. The benefits of multimedia, attention, connectivity, interactivity and individualization.

Enrollment requirements: basics of working with a computer in a web 2.0 environment.

Prerequisite for taking the course exam: class activity, online activity, exercise assignments, presentation

General and Specific Competence and learning outcomes of the course:
- integrating knowledge from advanced multimedia communication and interactive rich media,
- categorization of mobile multimedia devices in order to plan new generations of services for creativity and production,
- creating 3D animation of a graphic product in multimedia environments,
- using knowledge about modern network communication, the development of the Internet and the future of application development,
- connecting multimedia content on the cloud,
- designing individualized 2D codes, QR codes and labels for advanced multimedia communication,
- designing multimedia marking of graphic products for automatic reading and checking,
- integration of "Near field" communication,
- creation of individualized sound through actionscript and connection with computer graphics,
- designing communication in augmented reality, visual - near IR area

Course content (Syllabus) on a weekly basis:

1. L: Advanced multimedia communications and technologies, interactive "rich media". Programming multimedia elements of text, image, sound, video and interactive form as the highest level of multimedia.
   LAB: Getting to know tools for creating multimedia content and planning an individualized multimedia presentation.
   0.4 ECTS

2. L: An overview of the development of multimedia from the "desktop publishing" revolution to the "post pc" era.
   LAB: Work with text, image, sound, video and interactive format standards, formats and display on different devices and platforms.
   0.4 ECTS

3. L: New technological developments, multimedia future planning and design advanced multimedia communications, application and innovation.

LAB: Creation of a form for multimedia presentation in HTML 5.
Incorporation of individualized and designed multimedia content of images, text and interactive form.
0.4 ECTS

4. L: The share of multimedia in communicating via the Internet. Internet development, HTML5 and the future of application development. The future of mobile multimedia devices.
LAB: Embedding your own video presentation in an HTML5 document and connecting all content in the form of a personal multimedia presentation. Installation of an interactive form for multimedia communication in the form of questions and answers for the survey.

0.4 ECTS

5. L: Coded multimedia content, coded labeling of graphic products, coded communication.
LAB: Creating an individualized QR code and checking its readability. QR code processing in programs for vector and pixel graphics.
0.4 ECTS

6. L: Generation and design of individualized 2D codes, QR codes and tags for advanced multimedia communication.
LAB: QR Code Redesign – embedding an image into the background and front of the codes, getting to know the limitations and possibilities of designing an individualized QR code.
0.4 ECTS

7. L: Implementation of coded information in a conventional graphic product, business documentation and packaging for direct connection to databases.
LAB: Modification of the QR code - embedding the logo in the QR code.
0.4 ECTS

8. L: Barcode readers and infrared cameras for automatic controls and cash registers, coded verification information. Work with optical readers and applications I-nigma, Neo Reader, Microsoft Tag, Custom Tag.
LAB: Designing a personal Vcard code and its individualized multimedia content with associated multimedia presentation of personal data.
0.4 ECTS

9. L: New generation services for creativity and production. Adobe “touch” applications for professional design of multimedia content on tablets.
LAB: Creation of individualized Custom TAG code and readability check. Getting to know the possibilities and limitations in individualization through computer graphics.
0.4 ECTS

10. L: Individualization of sound through actionscript, connection with computer graphics, and embedding in HTML5 language.
LAB: Adding individualized elements to CustomTag elements, embedding personal individualized data and connecting to a personal multimedia presentation.

Selection and presentation of selected 2D codes.
0.4 ECTS

11. L: Designing 3D animation of a graphic product such as packaging, interactive 3D book for presentation in multimedia environments, web publishing.
LAB: Designing 3D animation of a graphic product, external object, basic elements in animation.
0.4 ECTS

12. L: Connecting multimedia content on the cloud, Adobe "creative cloud".
LAB: Designing 3D animation of a graphic product. Packaging with individualized codes.
0.4 ECTS

13. L: Communication in augmented reality, visual - near IR area.
LAB: Designing a 3D animation of a graphic book product with individualized codes on the cover.
0.4 ECTS

14. L: New generations of devices for multimedia communication in the form of glasses, Google glass, multimedia communication with speed in real time.
LAB: Designing a dynamic interactive 3D content and working on an interactive book page template.
0.4 ECTS

15. L: Comparison of codes in NIR and "Near field" communication. The future of marking graphic product for multimedia application. Advantages of multimedia; connectivity, interactivity and individualization.
LAB: Multimedia presentation of designed 3D graphic elements in HTML5 with the use of image, sound, text, video in the presentation, and the use of coded structures and interactive entry into multimedia content.
0.4 ECTS

Format of instructions:

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☒	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☒
activities in class ☒	test report ☒	oral exam ☒	portfolio ☐
seminar work ☐	experimental work ☒	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☐ Alternative choice tasks
☐ Multiple choice tasks
☒ Connecting and arranging task
☒ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Evaluation of student activities; work on exercises, project tasks, research, presentations. Midterm, written, oral exam.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Official survey

Student evaluation (survey) ☒

Other: Kliknite ovdje da biste unijeli tekst.

References

Required:

- Jens Ohm: „Multimedia Communication Technology“, Springer, 2004. Germany, ISBN: 3-540-01249-4
- Ashok Banerji, Ananda Mohan Ghosh: „Multimedia Technologies“, Tata McGraw Hill, NewDelhi, 2010., ISBN 978-0-07-066923-9

Books are available on the web.

Optional:

- Phil Dutson: „Creating QR and Tag code“, SAMS, 2013. Pearson Education, 2013, ISBN-13:978-0- 133-11844-5,
- Hiroko Kato, Keng Tan, Douglas Chai: „Barcodes for Mobile Devices“, Cambridge, 2010.,ISBN 978-0-521-88839-4
- Wojciech Cellary, Krzysztof Walczak : „Interactive 3D Multimedia Content“, Springer, 2012.,ISBN 978-1-4471-2496-2

Books are available on the web.

Methods of quality monitoring that ensure the acquisition of output knowledge, skills and competences:

Quality monitoring includes the analysis and evaluation of student achievements, project tasks on exercises and research activities with the aim of achieving the expected learning outcomes.

Name of the course: Selected chapters of quality management

Teacher: prof. PhD. Diana Milčić

Associate teachers:

Lectures (L): Milčić

Seminar (S):Milčić

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+2

ECTS credits: 5

Study programme: Graduate Status of the course: Elective

Semester: Winter Semester number: I

Possibility of teaching in English: Yes

Course objectives:The goal of the course is to familiarize students with different methods of quality improvement and quality management, and management systems, in order to apply them in the optimization of the graphic reproduction process

Enrollment requirements: No

Prerequisite for taking the course exam: NO

General And Specific Competence and learning outcomes of the course:
1. Develop a critical understanding and knowledge in quality related management concepts, disciplines and techniques. 2. Develop knowledge of the approaches and methodologies used to achieve continuous improvement, assurance, governance and leadership in quality. 3. Design and implement and critically evaluate Quality systems.

Course content (Syllabus) on a weekly basis:

1. Basic principles of quality management, process approach
2. Integrated quality management systems
3. Integrated quality management systems, application to graphic production
4. Continuous improvement methods (PDCA, Kaizen, Crosby), General improvement approach
5. Quality management system according to ISO 9000

6. Quality management system according to ISO 9000
7. Total quality management TQM
8. Application of TQM on graphic production process
9. Six sigma
10. Application of "six sigma" on graphic production process
11. "Leana" management
12. Application of "Leana" " on graphic production process
13. QFD - quality function development
14. FMEA – analysis of possible errors and consequences
15. Knowledge management

Format of instructions:

lectures ☒	laboratory ☐	online ☒
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☐	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☐	project ☐	practical work ☐
activities in class ☐	test report ☐	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☒

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☒ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Kliknite ili dodirnite ovdje da biste unijeli tekst.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: . N. R. Tague, The Quality Toolbox, ASQ Quality Press, Milwaukee, Wisconsin, 2005.
3. K. Bemowski, B. Stratton, How to Improve Just about Any Process, ASQ Quality Press, Milwaukee,
Wisconsin,

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Basics of applied photography

Teacher: asst. prof. PhD. Miroslav Mikota

Associate teachers:

Lectures (L): asst. prof. PhD. Miroslav Mikota

Seminar (S):-

Laboratory (LAB):asst. prof. PhD. Miroslav Mikota; Teo Žeželj, mag.ing.graph.tech. Ivana Pavlović, mag.ing.graph.tech.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+1

ECTS credits: 5

Study programme: Graduate Status of the course: Mandatory / Elective

Semester: Winter Semester number: I

Possibility of teaching in English: Only for foreign students

Course objectives: After studying the material and performing the exercises, the student will be able to choose and use recording equipment, record basic photographic motifs and motifs of the basic areas of applied photography, define, pre-process and process digital zapi photographs depending on the technique of realization, describe and analyze the basic technical and syntactic properties of photography, choose a photo depending on the medium of realization.

Enrollment requirements: -

Prerequisite for taking the course exam: Photo upload, photo evaluation, portfolio.

General And Specific Competence and learning outcomes of the course:
After learning, the student will be able to demonstrate knowledge and understanding in the field of photography, use a photographic camera and recording equipment, apply his knowledge and understanding in recording basic photographic motifs and basic motifs of applied photography, apply and demonstrate his knowledge and understanding in the pre-processing and processing of digital records photographs, apply and demonstrate their knowledge and understanding in basic knowledge of the technique and syntax of photography, apply and demonstrate their knowledge and understanding in the evaluation and selection of photographs.

Course content (Syllabus) on a weekly basis:

1. Introduction, development of photography; Introduction to the practical part

2. Divisions, working principles and choice of photographic devices; Practical work with different photographic devices
3. Divisions and selection of lenses; Practical work with different types of lenses
4. Accessories and photographic image recording media; Practical work with additional photographic equipment using different photographic image recording media
5. Recording with a photographic apparatus; Capture depth of field and motion
6. Basic pre-processing and processing of the digital recording of the photograph; Basics of work in a digital photography laboratory
7. Basics of work in the photographic laboratory - classic photographic systems; Basics of work in a classic photographic laboratory
8. Photographic syntax of color and black-and-white photographs; Shooting still life
9. Light and lighting; Portrait shooting
10. Techniques and syntactic approach to basic photographic motifs 1; Rules of optical balance I
11. Techniques and syntactic approach to basic photographic motifs 2; Rules of optical balance II
12. 1Areas of applied photography 1; Photos of landscapes, architecture
13. Areas of applied photography 2; Catalog photography, technical photography
14. Realization of photography; Processing and preparation of photos for portfolio
15. Evaluation and selection of photographs; Photo evaluation and portfolio creationPreparation and production of photographs for exhibitions

Format of instructions:

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☐	field work ☒
exercises on computers ☐	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☐	project ☐	practical work ☒
activities in class ☐	test report ☐	oral exam ☐	portfolio ☒
seminar work ☐	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☐ Multiple choice tasks
☐ Alternative choice tasks
☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:

Assessment and evaluation of students' work during classes and on the final exam:
Continuous monitoring of student work based on the system of assessment and self-assessment of photos, portfolio

Other:

Teaching process evaluation: -

Student evaluation (survey) ☐
Other:

Refrences

Required:
Mikota M: Kreacija fotografijom, V. D. T Publishing, Zagreb, 2000.
Ang T: Digitalna fotografija, Znanje, Zagreb, 2004.

Optional:
Kobre K: Photojournalism – the Professionals' approach Focal Press, Oxford, 2008. Langford M, Fox A, Sawdon Smith R: Langford's Basic Photography, Focal Press, Oxford, 2010.

Name of the course: Application of digital photography in reproduction media

Teacher: assoc. prof. PhD. Maja Strgar Kurečić

Associate teachers:

Lectures (L): Maja Strgar Kurečić

Seminar (S):-

Laboratory (LAB):Maja Strgar Kurečić

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+1

ECTS credits: 5

Study programme: Graduate Status of the course: Elective

Semester: Winter Semester number: I

Possibility of teaching in English: Yes

Course objectives: Teach the basics of digital photography with a balanced emphasis on technical, aesthetic and conceptual skills. Provide students with creative and technical assignments to make personal work. Provide students with the skills to analyse and critique images in a global context.

Enrollment requirements: no requirement

Prerequisite for taking the course exam: completed labs, completed final project

General And Specific Competence and learning outcomes of the course:
Use practical image capture and editing skills in digital photography. Understand exposure techniques in manual mode. Classify image capture equipment and judge suitability of the equipment for a given photography project. Evaluate and interpret aesthetics and concept of a photography project. Demonstrate creative and critical communication through the visual medium of photography. Create a portfolio of work.

Course content (Syllabus) on a weekly basis:

1. Anatomy of a DSLR camera
2. Camera Lens
3. Understanding exposure (ISO / aperture / shutter)
4. Image size and quality
5. ISO sensitivity and image quality

6. File format - RAW vs. JPEG
7. Image editing in Adobe Photoshop
8. Visual design concept
9. Composition
10. Basic principles of lighting
11. Studio portrait / outdoor portrait
12. Creative photographic techniques
13. Photo essay
14. Context in Photography
15. Final Project Presentations

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☒
exercises on computers ☒	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☒	practical work ☒
activities in class ☒	test report ☐	oral exam ☐	portfolio ☒
seminar work ☐	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☒ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☒ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Students’ progress undergoes continuous assessment which is carried out by means of accumulation of points. The students can collect the points during the semester by fulfilling

their tasks through various activities. The aim of this assessment system is to allow the students to obtain enough points to get the final grade without taking the final exam.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Student survey

Student evaluation (survey) ☒
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: Langford, M., Fox, A., & Smith, R. S. (2015). Langford's Basic Photography: The Guide for Serious Photographers. Focal Press. Kelby, S. (2020). The Digital Photography Book. Rocky Nook, Inc.

Optional: London, B., Stone, J., & Upton, J. (2017). Photography. Pearson. Terry Barrett, P. (2011). Criticizing Photographs. McGraw-Hill Education

Name of the course: Computer Typography

Teacher: Assoc. Prof. Ivana Žiljak Stanimirović, Ph.D.,
Asst. prof. Nikolina Stanić Loknar, Ph.D.

Laboratory (LAB): Asst. prof. Nikolina Stanić Loknar, Ph.D., Ana Agić, mag.ing.graph.tech.; Željko Bosančić, mag.ing.graph.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L; LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2
Lectures (30 hours), laboratory exercises (30 hours)

ECTS credits: 6

Study programme: Graduate Study

Status of the course: Elective

Semester: Winter Semester number: I

Possibility of teaching in English: for foreign students

Course objectives:
Knowledge of the application of typography in sophisticated graphic environments and programming languages. Designing typography within a full-page break in the original PostScript language for design solutions which require individualization. Preparation of the letter for high editions with individualized digital printing. Typesetting programming and conversions and transition to formatting for web and Clear Type standards. Unicode, font bases for different operating systems. Designing in OpenType scalable format. Line code programming: bar codes, transport, library applications. Typography design within individualized 2D code with alphanumeric characters. Programming of individualized typography with links from databases. Special purposes: protective syllable, numbering, microtext. Comparison, development and commonalities and differences of PostScript, HTML and Photo Typesetting. Typography planning for different operating systems and for different printing technologies. Individualized raster elements within the letterpress structure. Typography within lenticular 3D systems. Dynamic typography and Actionscript programming of dynamic deformation of letter characters. SVG typography, rotation, Bezier curve typography for multimedia applications.

Enrollment requirements: basics of working with a computer in a Web 2.0 environment.

Prerequisite for taking the course exam: class activity, online activity, exercise assignments, presentation

General and Specific Competence and learning outcomes of the course:
- designing individualized typography with software solutions in the original PostScript language

- Typography design in vector graphics
- Knowledge of tabular typeface programming and conversions and the transition to formatting for the web and the Clear Type standard
- knowledge of line code programming, font code and typography design within individualized 2D code with alphanumeric characters
- design of protective logo, numbering, microtext
- designing individualized raster elements within the structure of letter cut
- designing typography within lenticular 3D systems
- creating dynamic typography using actionscript and SVG technology

Course content (Syllabus) on a weekly basis:

1. L: Designing typography within a full-page break in the original PostScript language for design solutions that require individualization.
   LAB: Typography design in native PostScript language
   0.4 ECTS

2. L: Typesetting for high-run edition in personalized digital printing. Numbering of high volumes
   LAB: Preparation of letterhead for individualized digital printing, numbering as a software solution.
   0.4 ECTS

3. L: Tabular programming and conversions and transition to formatting for web and Clear Type standarde
   LAB: Web Tablet Style Programming and Clear Type Standards
   0.4 ECTS

4. L: Unicode, font bases for different operating systems.
   LAB: UNICODE code system. Tabular syllable conversions
   0.4 ECTS

5. L: Designing in OpenType scalable format.
   LAB: Exercise in OpenType scalable format. Typography design in OpenType format
   0.4 ECTS

6. L: Line code programming: bar codes, transport, library applications.
   LAB: Code font programming
   0.4 ECTS

7. L: Typography design within individualized 2D code with alphanumeric characters.
   LAB: Typography within an individualized 2D code.
   0.4 ECTS

8. L: Programming individualized typography with database links.
   LAB: Typography design in vector graphics and programmatic connection with links from databases.
   0.4 ECTS

9. L: Lecture on special purposes and applications of typography: guard syllable, numbering, microtext.
   LAB: Exercises with programmatic definition of microtext, readability of protective typography.
   0.4 ECTS

10. L: Comparison, development, and commonalities and differences of PostScript and HTML.
    LAB: Postscript exercise and comparison of PostScript and HTML.
    0.4 ECTS

11. L: Typography planning for different operating systems and for different printing technologies.
    LAB: Tabular typeface conversions and transition to formatting for the web and the Clear Type standard
    0.4 ECTS

12. L: Individualized raster elements within the letterpress structure.
    LAB: Defining individual raster elements in PostScript and embedding them in a typography outline. Rasterization of letter characters.
    0.4 ECTS

13. L: Typography within lenticular 3D systems. Legibility rules with respect to line spacing.
    LAB: Designing typography within lenticular 3D systems, practicing on different lenticular plates with regard to line spacing, defining program solutions in PostScript.
    0.4 ECTS

14. L: Dynamic typography and action script programming of dynamic deformation of letters characters.
    LAB: Character deformation in actionscript. Dynamic typography.
    0.4 ECTS

15. L: SVG typography, rotation, Bezier curve typography for multimedia applications.
    LAB: Dynamic typography exercises using Action script and SVG technology
    0.4 ECTS

Format of instructions:

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☒	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☒
activities in class ☒	test report ☒	oral exam ☒	portfolio ☐
seminar work ☐	experimental work ☒	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☒ Connecting and arranging task

☐ Alternative choice tasks ☒ Problem solving tasks

☐ Multiple choice tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Evaluation of student activities; work on exercises, project tasks, research, presentations. Colloquy, written, oral exam.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Official survey

Student evaluation (survey) ☒

Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required:

- Vilko Žiljak, Klaudio Pap: "PostScript"
- "Python in FontLab Studio",http://www.fontlab.com/python-scripting/

Optional:

Methods of quality monitoring that ensure the acquisition of output knowledge, skills and competences:

Quality monitoring includes the analysis and evaluation of student achievements, project tasks on exercises and research activities with the aim of achieving the expected learning outcomes.

Name of the course: Reproduction of image information

Teacher: prof. PhD. Lidija Mandić

Associate teachers:

Lectures (L): Lidija Mandić

Seminar (S):Lidija Mandić

Laboratory (LAB):Petar Branimir Jelušić

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+1

ECTS credits: 6

Study programme: Graduate Status of the course: Elective

Semester: Winter Semester number: I

Possibility of teaching in English: Only for foreign students

Course objectives:Students will distinguish digital methods of digital image reproduction and digital screening, evaluate their characteristics and summarize the theoretical frameworks of their implementation. Categorize implemented screening systems, their advantages and disadvantages and suitability for a particular one reproduction device.

Enrollment requirements: no

Prerequisite for taking the course exam: exercises

General And Specific Competence and learning outcomes of the course:
The student will be able to: Break down modern methods of digital screening Describe the basic principles of image information reproduction Explain the conditions that enable the use of the screening system Choose the optimal implementation of the digital screening system depending on the characteristics of reproduction system Predict the screen result depending on the screening method Interpret errors that occur during screening Apply Matlab to create basic functions and scripts Choose the optimal visualization method and export the created visualization for further use

Course content (Syllabus) on a weekly basis:

1. General overview of image information reproduction systems
2. CIE colorimetric system

Exercise 1: Getting to know the MATLAB programming environment

3. Devices and methods for controlling the reproduction of image information

   Exercise 2: Basic integrated MATLAB functions

4. A model of the human visual system and its sensitivity to brightness, chromaticity, contrast and orientation

   Exercise 2: Basic integrated MATLAB functions

5. Color mixing models

6. Fourier analysis of periodic structures

   Exercise 3: Working with variables and statistical data processing in MATLAB

7. Moire phenomenon

8. Measures of the quality of the reproduced image

   Exercise 4: Working with images in MATLAB

9. Basic principles of screen system development

10. Monotone segmentation and tabular screening

    Exercise 5: Implementation of the algorithm for tabular image rasterization

11. Screening with a level matrix

12. screen system control

    Exercise 6: Implementation of the level matrix screen algorithm

13. Iterative halftoning methods

14. screening by error diffusion

    Exercise 7: Implementation of the system for quantifying the quality of the reproduced image

15. Multitone raster systems

Format of instructions:

lectures ☒	laboratory ☒	online ☐
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☒	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☐	project ☐	practical work ☐
activities in class ☒	test report ☒	oral exam ☒	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks
☐ Alternative choice tasks ☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Assessment and evaluation of students' work during classes and on the final exam: 2 preliminary exam during the semester. Exercise tasks

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐

Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: Lau, L. D., Arce, G. R. Modern Digital Halftoning, CRC Press, 2011.; Ulichney, R. Digital Halftoning, MIT Press, 1987.

Optional: Henry R. Kang. Digital Color Halftoning. SPIE Press 1999.; Amidror, I. The Theory of the Moiré Phenomenon, Volume I: Periodic Layers, Springer-Verlag, 2009

Name of the course: Technical editing and printing management

Teacher: assoc. prof. PhD. Igor Zjakić

Associate teachers:

Lectures (L): Igor Zjakić

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):Igor Zjakić, Irena Bates

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2

ECTS credits: 6

Study programme: Graduate Status of the course: Elective

Semester: Winter Semester number: I

Possibility of teaching in English: Only for foreign students

Course objectives:To teach students how to technically edit and manage graphic production

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: Kliknite ili dodirnite ovdje da biste unijeli tekst.

General And Specific Competence and learning outcomes of the course:
The course introduces students to the technical responsibilities of a production managing. Jobs are defined in contact with the client, determination of technical - technological parameters in the graphic production chain, selection of the optimal technique and technology of test printing, as well as tasks during the run-in of printing and reception editions. Special attention is paid to the way of working in the author-publishing team and the relationship between the publisher and the printing house and the tasks of the publishing manager in defining those relationships. Customer requirements, characteristics of manuscripts, the format of the printing press, printing technique and technology as parameters for defining the scope i graphic product format. Selection of stages when creating a graphic product according to the client's requirements, the conceptual design of the graphic product, the selected printing technique and technology. The influence of the desired characteristics of the graphic product on the selection of the printing substrate and the selection of the printing substrate. Defining characteristics of front pages, covers and appendices. Specifics in the implementation of production.

Course content (Syllabus) on a weekly basis:

1. Defining tasks in contact with the client, the legality of art and graphic editing in depending on the client's requirements..

2. The characteristics of the manuscript, the format of the printing press, the printing technique and technology as parameters defining the scope and format of the graphic product in the first edition. Price-quality ratio.
3. Specifics when editing books. Managing the print run depending on the selected color system in printing. Determination of characteristics and selection of illustrations
4. Ordering and selection of illustrations according to sketches or ideas of the customer.
5. Author approval. Approved solution. Controlling illustrations. Making corrections according to the test print. Selection of the optimal technique and technology of test printing and jobs during printing and product manufacturing.
6. Selection of stages when creating a graphic product according to the client's requirements, conceptual design graphic product, selected printing technique and technology.
7. The influence of the desired characteristics of the graphic product on the choice of printing substrate and selection printing pads. Number selection. Color in print. Characteristics of technical editing and running newspapers and magazines. Specifics when managing the circulation in the printing of calendars, postcards, catalogs, digital printing, etc. Defining hard and soft binding parameters depending on the entire production. Defining the printing sheet with regard to the thickness of the spine, stitching and stapling.
8. Defining the characteristics of P/Z, cover (ISBN, ISSN number) and accessories (appendices, cover, etc.).
9. Production problems during the binding with printing from sheet, magazine printing and newspaper printing.
10. Determination of production parameters and legality for stamping, bending, bending, etc.
11. Defining production in offset printing from sheet fed and magazine printing. Determining the price of work, materials and fixed production costs
12. Creation of purchase order and accompanying documentation.
13. Creation of calculative and technical documents.
14. Defining the price of the product.
15. Product development management

Format of instructions:

lectures ☒	laboratory ☒	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☒	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☒	test report ☒	oral exam ☒	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐
Objective-type tasks (multiple items can be selected):

☒ Guessing and completion tasks ☒ Multiple choice tasks
☐ Alternative choice tasks ☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Assessment and evaluation of student work during classes and at the final exam

Other: Methods of quality monitoring that ensure the acquisition of output knowledge, skills and competences: The quality is monitored by monitoring the independence of the work, during the attendance of the course as well as afterwards.

Teaching process evaluation: The exam is taken in writing by solving a project assignment.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required:. Zjakić: tehničko uređivanje u procesu izrade knjige, HSN, 2013.;

Optional: I. Zjakić: upravljanje kvalitetom ofsetnog tiska. HSN, 2007. H. Kiphan: Handbook of Print media, Springer, 2001.

Name of the course: Packaging printing

Teacher: asst. prof. PhD. Irena Bates

Associate teachers:

Lectures (L): asst. prof. PhD Irena Bates

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):asst. prof. PhD Irena Bates

(*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: Kliknite ili dodirnite ovdje da biste unijeli tekst.

ECTS credits: 5

Study programme: Graduate Status of the course: Mandatory / Elective

Semester: Winter Semester number: I

Possibility of teaching in English: Only for foreign students

Course objectives:1) the possibility of applying knowledge of packaging printing methods. 2) the possibility of applying knowledge of quality management in offset printing. 3) the possibility of applying knowledge of quality management in flexographic printing. 4) the possibility of applying knowledge of quality management in gravure printing. 5) the possibility of applying knowledge of quality management in screen printing. 6) the possibility of applying knowledge in the quality management of digital printing. 7) the possibility of applying knowledge of decoration, protection and coding methods. 8) the possibility of applying knowledge in the use of packaging materials. 9) The possibility of applying knowledge of standardization of printing quality in packaging printing. 10) The possibility of analyzing and synthesizing the reproducibility parameters of the packaging printing process.

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: The laboratory portion of the course must be completed.

General And Specific Competence and learning outcomes of the course:
1) Categorize the history of packaging printing 2) Categorize the printing materials 3) Evaluate and categorize packaging printing technologies 4) Analyze trends and standards that describe the quality of packaging printing. 5) Categorize and propose an environmentally friendly way of packaging printing 6) Categorize and propose decoration and protection and categorize codes. 7) Evaluate the quality of packaging printing 8) Suggest how to improve the quality of flexographic, offset and gravure printing.

Course content (Syllabus) on a weekly basis:

1. History of packaging printing. Methods and possibilities of packaging printing with letterpress printing. Advantages and disadvantages of packaging printing with letterpress printing technique.
2. Types of printing substrate and methods of packaging printing. Printing on flexible and rigid substrates.
3. Methods and possibilities of packaging printing using offset printing.
4. Advantages and disadvantages of packaging printing with offset printing technique.
5. International trends and quality standards in offset printing.
6. Methods and possibilities of packaging printing with gravure printing technique.
7. Advantages and disadvantages of packaging printing with gravure printing technique.
8. International trends and quality standards in gravure printing.
9. Methods and possibilities of packaging printing with flexographic printing technique.
10. Advantages and disadvantages of packaging printing using flexographic printing technique.
11. International trends and quality standards in flexographic printing.
12. Methods and possibilities of packaging printing with screen printing technique. Advantages and disadvantages of packaging printing using screen printing technique. International trends and quality standards in screen printing.
13. Processes and possibilities of packaging printing with digital printing technique. Advantages and disadvantages of packaging printing using digital printing technique. International trends and quality standards in digital printing.
14. Environmental awareness in packaging printing (types of printing substrate, types of inks, recycling of packaging, etc.).
15. Types of decoration and protection. Types of codes and labels used to transmit stored information.

Format of instructions:

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☒
other: ☒		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☒
activities in class ☒	test report ☒	oral exam ☒	portfolio ☐
seminar work ☐	experimental work ☒	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☒ Guessing and completion tasks ☒ Multiple choice tasks

☒ Alternative choice tasks ☒ Connecting and arranging tasks

☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
yes

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: yes

Student evaluation (survey) ☒

Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: 1. Bolanča S., (2013), Tisak ambalaže, Hrvatska sveučilišna naklada, Zagreb
2. Kiphhan, H., (2001), Handbook of Print Media, Springer, Berlin
3. Brody, A. L., Marsh, K. S., (1997.), The Wiley Encyclopedia of packaging technology, 2ed. John Wiley & Sons, Inc., New York, Chichester, Weinheim, Brisbane, Singapore, Toronto
4. Handbook on Printing technology, 2th edition, (2011), Asia Pacific Business Press Inc., Delhi
5. Vujković, I., Galić, K., Vereš, M. (2007), Ambalaža za prehrambene namirnice, Tectus, Zagreb
6. Leach, R.H., Pierce, R.J., (1993), The Printing Ink Manual, 5th edition, Springer

Optional: 1. Flexography: Principles and Practices, 5th edition, Foundation of Flexographic Technical Association Inc. (1999), Ronkonkoma; New York,
2. Izdebska, J., Sabu, T. (2016), Printing on polymers, Elsevier
3. Gravure Process and Technology, (2003), GEF & GAA, Rochester, New York
4. Fairley, M., (2004), Encyclopedia of Labels and Label Technology, London, England

Name of the course: Graphic Design 3

Teacher: prof. PhD. Maja Brozović

Associate teachers:

Lectures (L): prof. PhD. Maja Brozović

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):asst. prof. PhD Dorotea Kovačević

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 1+0+3

ECTS credits: 5

Study programme: Graduate Status of the course: Mandatory

Semester: Winter Semester number: I

Possibility of teaching in English: Only for foreign students

Course objectives: To obtain the knowledge and acquire the skills in design of a sign as a carrier of a message with regard to the functions that the message should convey. Course is focused on systematic analysis of symbols and the concept of creating meaning through visual communication. Form, in the context of visual communication, is thought of as a means for information transmission through graphic media communication systems. Symbols (signifiers) are not analysed on the basis of case studies, but rather as integral parts of an organised information system. Particular attention is given to notions and definitions of sign and meaning, as given by various influential authors. Through lectures and practical exercises, students study visual forms from the standpoint of their structure, as highly or scarcely structured symbols, and their respective formal appearance. The development of the tendency towards reduction of figurative shapes to wholly abstract signs is being considered. Pictorial systems and their practical application are studied, including standardised systems of pictograms in everyday use. Semantic analysis is carried out concerning general functions of symbols and their application in shaping visual messages through: relations between symbol and referent, author and message, parts and whole of the message, assessment of appropriateness of a symbol structure regarding target audience, accessibility of the visual message and the contribution of the graphic structure in clarifying the message's content. Through practical work, students will obtain knowledge and acquire skills for designing signs on the basis of content, attitude, inventiveness, context, non-content factors and style.

Enrollment requirements: Basic level work in graphic computer programs for image and text processing

Prerequisite for taking the course exam: Attended lectures, finished all exercises, submitted all works designed and realized on exercises in printed form and digital form in the Merlin system

General and Specific Competence and learning outcomes of the course:
- create different signs with respect to structuredness
- analyse signs and their meanings
- integrate signs into a unique formal system
- propose a suitable illustrative system for the presentation of information
- design a sign in accordance with the focus on a particular function in the communication process

Course content (Syllabus) on a weekly basis:

1. A highly structured sign
   Concept and solution of a highly structured sign on a given topic (0.33 ECTS)

2. A low-structured sign
   Concept and solution of a low-structured sign on a given topic (0.33 ECTS)

3. Pictograms
   Design the defined number of signs as a unique system of pictograms (0.33 ECTS)

4. Analysis of sign and meaning
   Reduce the given figurative form to a completely abstract sign through a certain number of phase - sketching (0.33 ECTS)

5. Illustrative systems
   Reduce the given figurative form to a completely abstract sign through a certain number of phase - realization (0.33 ECTS)

6. Illustrative systems
   Illustrate a specific location with independent signs (0.33 ECTS)

7. Illustrative systems - examples
   Corrections of the selected illustrative system according to the information hierarchy (0.33 ECTS)

8. General sign functions
   Design a certain product with regard to the level of quality (0.33 ECTS)

9. Referential function of the sign
   Present the animation of a stylized form through a certain number of phase (0.33 ECTS)

10. Emotional function of the sign
    Present personal view of a certain concept in the form of a sign (0.33 ECTS)

11. Aesthetic function of the sign
    Form sign for concepts characterized by symmetry and rhythm (0.33 ECTS)

12. Conative function of the sign
    Show signs for different target groups (0.33 ECTS)

13. Contact function of the sign
    Design sign with an emphasized contact function (0.33 ECTS)

14. Metalinguistic function of the sign
    Present sign with an emphasized metalinguistic function (0.33 ECTS)

15. Representation of individual sign functions
    Analyse the obtained sign through the representation of individual functions (0.33 ECTS)

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☒	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☒
activities in class ☒	test report ☐	oral exam ☐	portfolio ☒
seminar work ☐	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

The mean value of all grades of practical works realized in exercises, activities in lectures and exercises.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

References

Required:
- van der Vlught, R.: Logo life: Life Histories of 100 Famous Logos, BIS Publishers, Amsterdam, 2012.
- Abdullah, R.; Hübner, R.: Pictograms, icons & signs: a guide to information graphics, Thames & Hudson, 2006.
- Arnheim, R.: Umetnost i vizuelno opažanje, Univerzitet umetnosti, Beograd, 1981.
- Rot, N.: Znakovi i značenja, Nolit, Beograd, 1982.
- Perasović, M.: Slikarski rječnik, Narodno sveučilište Split, Split, 1994.
- Bense, M.: Estetika i teorija informacija, Prosveta, Beograd, 1977.
- Bertin, J.: Semiology of Graphics: Diagrams Networks Maps, University of Wisconsin Press, Madison Wis., 1983.
- Harris, R.L.: Information Graphics, Oxford University, New York and Oxford Press, 2000.
- Robbins, N.B.: Creating More Effective Graphs, John Wiley & Sons, Hoboken NJ, 2005.
- Ware, C.: Information Visualization: Perception for Design, San Francisco CA, Morgan Kaufmann Publishers, 2004.
- Guiraud, P.: Semiology, Routledge, 1975.
- Jakobson, R.: Lingvistila i poetika, Nolit, Beograd, 1966.
- Lidwell, W.; Holden, K; Butler, J.: Univerzalna načela dizajna, MATE d.o.o, Zagreb, 2006.

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Applied photography 2

Teacher: asst. prof. PhD. Miroslav Mikota

Associate teachers:

Lectures (L): asst. prof. PhD. Miroslav Mikota

Seminar (S):-

Laboratory (LAB):asst. prof. PhD. Miroslav Mikota; Teo Žeželj, mag.ing.graph.tech. Ivana Pavlović, mag.ing.graph.tech.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2

ECTS credits: 6

Study programme: Graduate Status of the course: Mandatory

Semester: Winter Semester number: I

Possibility of teaching in English: Only for foreign students

Course objectives:After studying the material and performing the exercises, the student will be able to define and select elements of exposure for shooting in different light conditions, choose the appropriate equipment for shooting depending on the technical and syntactic characteristics of the photo, use hardware and software solutions of the digital photography laboratory, choose the appropriate recording format of the photo, define technical characteristics of the digital recording of photography, record and realize motifs of different fields of application of photography.

Enrollment requirements: -

Prerequisite for taking the course exam: Photo upload, photo evaluation, portfolio.

General And Specific Competence and learning outcomes of the course:
After learning, the student will be able to: apply and demonstrate his knowledge in the field of shooting complex motifs in applied photography, apply and demonstrate his knowledge in the field of shooting in different lighting conditions, communicate and present his ideas in the field of applied photography, apply and demonstrate his knowledge in the application of solutions from areas of basic processing of the digital recording of the photograph.

Course content (Syllabus) on a weekly basis:

1. Introduction, digital photography system; Introduction to the practical part

2. Specifics of recording with a digital camera;

Photographs of perspective and semantic perspective

3. Advanced ways of measuring light;

Perspectives in photography, volume modulation through light measurement

4. Work in low light conditions; Applying ISO sensitivity in low light conditions

5. Digital photography laboratory; Volume modulation through a digital photographic laboratory

6. Media and record formats, pre-processing of the digital photo record; Media and record formats, pre-processing of a digital record of a photograph on the example of a newspaper photograph

7. Spaces and color depth during recording;

Spaces and depth of colors when shooting on the example of an ambient portrait

8. Processing of a digital record of a photographic image;

Processing of the digital record of the photographic image for catalog photography

9. Photographic syntax; Icon, index, symbol

10. Total photo; Total photography through mood photography, photography that convinces and photography that explains

11. Types of newspaper and documentary photography; Photo interest, photo commentary, photo essay

12. Technical and semantic-syntactic approach to fashion photography; Fashion photography

13. Technical and semantic-syntactic approach to scenic photography; Scene photography

14. Technical and semantic-syntactic approach to sports photography and movement photography;
Sports and movement photography

15. Technical and macro photography; Technical approach to macro photography**Format of instructions:**

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☐	field work ☒
exercises on computers ☐	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☐	project ☐	practical work ☒
activities in class ☐	test report ☐	oral exam ☐	portfolio ☒

seminar work ☐ experimental work ☐ continuous knowledge examination ☒

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks

☐ Alternative choice tasks ☐ Connecting and arranging tasks

☐ Problem solving tasks

Other:

Assessment and evaluation of students' work during classes and on the final exam:

Continuous monitoring of student work based on the system of assessment and self-assessment of photos, portfolio

Other:

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐

Other:

Refrences

Required:

Mikota M: Kreacija fotografijom, V. D. T Publishing, Zagreb, 2000.

Ang T: Digitalna fotografija, Znanje, Zagreb, 2004. Zagreb, 2004.

Optional:

Kobre K: Photojournalism – the Professionals' approach Focal Press, Oxford, 2008. Langford M, Fox A, Sawdon Smith R: Langford's Basic Photography, Focal Press, Oxford, 2010.

Name of the course: Realization of conceptual solutions 1

Teacher: prof. PhD. Maja Brozović

Associate teachers:

Lectures (L): prof. PhD. Maja Brozović

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):asst. prof. PhD Dorotea Kovačević

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+1

ECTS credits: 5

Study programme: Graduate Status of the course: Mandatory

Semester: Winter Semester number: I

Possibility of teaching in English: Only for foreign students

Course objectives: To obtain the knowledge and skills in designing advertising graphic media from conceptual proposal to printed graphic product by respecting aesthetic, economic and technical-technological requests. The course is based on the methodology of solving a concrete design problem from concept to presentation in the form of graphic media. The conceptual solution of the graphic media is presented through the creation of a printed solution and a project task that includes the elaboration of the conceptual solution based on the possibilities of the reproduction process. Graphic media should be designed in relation to the defined target group and realized on the basis of the obtained research results. Within the course, each student presents the final solution through a project assignment, with an oral presentation and a printed solution in the form of graphic media.

Enrollment requirements: Basic level work in graphic computer programs for image and text processing.

Prerequisite for taking the course exam: Attended lectures, completed all exercises, make a presentation, submitted project assignment and delivered printed graphic media.

General and Specific Competence and learning outcomes of the course:
- propose an innovative and functional conceptual solution of graphic media
- provide structural elements in accordance with the target group
- assess the technical limitations caused by the reproduction process of creating graphic media
- valorise the entirely costs of different proposals for graphic media solutions
- plan the performance procedures of the graphic media within the framework of the realization conceptual solution
- present information, concept, problems and their solutions to a professional audience

Course content (Syllabus) on a weekly basis:

1. Introduction to the course - presentation of the topic for which the advertising graphic medium will be designed (0.33 ECTS)

2. Different target groups of users - proposals solutions in accordance with the target group with regard to aesthetic and technological parameters
   Determining the target group for which advertising graphic media will be created on a given topic (0.33 ECTS)

3. Approach to the problem: the goal of advertising graphic media, research questions and defining hypotheses (0.33 ECTS)

4. Choosing the methods for obtaining the necessary information on the design of graphic media
   Critical review of the content of graphic media and structuring of information in accordance with the target group (0.33 ECTS)

5. Analysis of proposals for ready-made graphic media solutions using line and plane as visual structure elements (0.33 ECTS)

6. Analysis of proposals for ready-made graphic media solutions using color as a dominant element of the visual structure
   Defining the technological parameters of graphic media and selecting the grid systems for content design (0.33 ECTS)

7. Different graphic media design styles aimed at the target group: minimalist, typographic, children's, retrospective, etc. (0.33 ECTS)

8. Defining structural elements in relation to technical-technological requests
   Choosing the appropriate typography, evaluation of the readability of text content, application of typographic principles in design of graphic media (0.33 ECTS)

9. Cost analysis of individual development phase: work order and the bill of cost for each solution (0.33 ECTS)

10. Obtained results analysis, results discussion, confirmation of hypotheses
    Selection and preparation of image content, assessment of their visual compatibility with graphic media and adaptation of this content to the target group (0.33 ECTS)

11. Design activity: defining format, grid, typography (0.33 ECTS)

12. Design activity: defining structural elements, design principles. Realization of solutions in graphic media
    Final design of the conceptual solution and prepress of graphic media (0.33 ECTS)

13. Oral presentation of conceptual solution of graphic media to all course participants (0.33 ECTS)

14. Oral presentation of conceptual solution of graphic media to all course participants (0.33 ECTS)
    Evaluation of the realized graphic media from the aspect of technological performance and compatibility of the design solution with the target group (0.33 ECTS)

15. Oral presentation of conceptual solution of graphic media to all course participants (0.33 ECTS)

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☒	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☒
activities in class ☒	test report ☐	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

The final grade includes individual scores from:
- oral presentations of the advertising media design to all course participants
- printed graphic media - project assignment
- activities at lectures and exercises

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐

Other: Kliknite ovdje da biste unijeli tekst.

References

Required:
- Robin Landa: Graphic Design Solutions, Thomson Delmar Learning, 2006.
- H. Kipphan: Handbook of Print Media, Springer, Berlin, 2001.
- J. Sullivan: Broshures: making a strong impression, Rockport Publishers Inc., Glaucester, Massachusetts, 2004.

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Packaging and technology 1

Teacher: asst. prof. PhD. Branka Lajić; asst. prof. PhD. Davor Donevski

Associate teachers:

Lectures (L): asst. prof. PhD Branka Lajić

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):asst. prof. PhD Davor Donevski

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+2

ECTS credits: 5

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Yes

Course objectives:Course objectives are making students able to perform packaging and packaging material testing, selection of packaging materials and packaging design. Objectives encompass acquiring theoretical knowledge about packaging and packaging materials' properties and testing methods, as well as relations between properties of materials and properties of packaging.

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: Completion of packaging design project

General And Specific Competence and learning outcomes of the course:
Upon completion of the course students will be able to perform testing of packaging materials, apply models for prediction of packaging strength and choose appropriate packaging materials.

Course content (Syllabus) on a weekly basis:

1. Strength of packaging materials: stress and strain (0,16)
   Problem sets – Stresses and strains (0,16)
2. Cardboard buckling strength (0,16)
   Problem sets – cardboard buckling strength (0,16)
3. Compressive strength testing of packaging materials: ECT, FCT. Relation between ECT and box load capacity. (0,16)
   Material testing – ECT and FCT. Problem sets – prediction of box load capacity from ECT results (0,16)
4. Bending resistance of corrugated board (0,16)
   Bending resistance testing (0,16)

5. Puncture resistance, bursting strength, and bending resistance of liners. Relations between properties of materials and properties of packaging (0,16)
   Puncture resistance, bursting strength and bending resistance testing (0,16)
6. Short-span compression (SCT) test. Relation between SCT and packaging properties. (0,16)
   Performing SCT (0,16)
7. Relations between strength of liners and strength of corrugated composite (0,16)
   Prediction of corrugated composite strength from strengths of its components (0,16)
8. Box compression test (BCT). Safety factors based on expected conditions of transport and storage (0,16)
   Performing BCT (0,16)
9. Design and testing of paper bags (0,16)
   Problem sets – design of paper bags (0,16)
10. Design and testing of cardboard drums (0,16)
    Problem sets – design of cardboard drums (0,16)
11. Design and testing of flexible packaging (0,16)
    Problem sets – design of flexible packaging (0,16)
12. Relations between packaging maerials' properties and machinability (0,16)
    Problem sets – selection of materials based on packaging operations (0,16)
13. Packaging materials and packaging testing laboratory. Norms, equipment and testing conditions (0,16)
    Planning testings (0,16)
14. Application of finite element method (FEM) for prediction of packaging strength (0,16)
    Prediction of packaging strength using FEM (0,16)
15. Reflection on previous topics, integration and preparation for final project (0,16)
    Project example (0,16)

Format of instructions:

lectures ☒	laboratory ☒	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☒	practical work ☐
activities in class ☐	test report ☐	oral exam ☐	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☐ Multiple choice tasks
☐ Alternative choice tasks
☐ Connecting and arranging tasks
☒ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Evaluation of final project.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Tracking how successfully students solve problems in smaller groups.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: 1. Kirwan, M. J., Paper and Paperboard Packaging Technology, Blackwell Publishing, Oxford, 2005; 2. Markstrom, H., Testing Methods and Instruments for Corrugated Board, Lorenzten and Wettre

Optional: Alfirević, I., Nauka o čvrstoći I, Golden marketing, 1995.

Name of the course: Workflow automation

Teacher: prof. PhD. Klaudio Pap

Associate teachers:

Lectures (L): prof. PhD. Klaudio Pap

Seminar (S):

Laboratory (LAB):prof. PhD. Klaudio Pap

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis 2+0+1

ECTS credits: 5

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

Course objectives:Training for the implementation of workflow automation in graphic production using existing norms and standards. Independent development with the arrival of future technologies. Workflow automation in graphic production based on norms. Integration of knowledge of norms and standards in the graphic industry from various sources into a unique way of describing it in the form of an XML document. Introduction of integration and automation of workflows in graphic industry systems. Studying continuous automatic production processes, job processing, and job monitoring. Describing a digital work order with XML elements and attributes. Creating individual solutions for automating graphic systems with JDF interpreters. Automatic workflow with merging and branching actions from graphic production process nodes. Automatic machine setup before the scheduled job arrives. Multiple start-stop mechanisms for digital work orders. Real-time financial and time tracking of jobs. Connecting publishers, printers, paper distributors, finishing and cardboard companies, cooperatives, and delivery companies. Tools and infrastructure for automating workflows.

Enrollment requirements:

Prerequisite for taking the course exam: Attended lectures, completed exercises

General And Specific Competence and learning outcomes of the course:
Preparation of complex design tasks for the design and realization of a graphic product in accordance with resources
Valorization of the elements of a particular phase of the implementation of the plan in relation to the set task (plan research, production, design)
Planning and evaluation of processes and necessary resources in accordance with the

development of graphic technology;
Modeling of the graphic process with highly structured programming languages
Optimization of process procedures in graphic reproduction
Suggesting the implementation of workflow automation in graphic production using existing ones norms and standards
Creation of new standards for current and future machines and processes using the XML language Application of knowledge of the XML language to define a digital work order
Independent creation of a graphic production automation model

Course content (Syllabus) on a weekly basis:

1. Lectures: Introduction to workflow automation (0.3ECTS)
2. Lectures: Automation of workflows in graphic production based on standards; Exercises: Creation of norms in the graphic industry (0.3 ECTS)
3. Lectures: Norms and standards in the graphic industry; Exercises: Application of created norms for the integration of knowledge from various sources (0.3 ECTS)
4. Lectures: XML document form; Exercises: Creating XML documents (0.4 ECTS)
5. Lectures: Digital work order with XML elements and attributes; Exercise: Using XML language for defining a digital work order (0.3 ECTS)
6. Lectures: Process phases of continuous automatic production; Exercises: Standardization graphic processes using XML language (0.3 ECTS)
7. Lectures: Work processing and monitoring of continuous automatic production; Exercises: Standardization of graphic machines using XML language (0.3 ECTS)
8. Lectures: Integration and automation of workflows in the graphic industry; Exercises: Defining workflows in XML technology (0.4 ECTS)
9. Lectures: Creation of individual solutions in workflow automation; Exercises: Creation of individual solutions in workflow automation (0.3 ECTS)
10. Lectures: JDF interpreters; Exercises: Using the JDF interpreter (0.3 ECTS)
11. Lectures: Process nodes of graphic production: Exercises: Modeling of joining and branching of graphic production process nodes (0.3 ECTS)
12. Lectures: Automatic setting of machines; Exercises: Automatic setting of machines (0.4 ECTS)
13. Lectures: Multiple start-stop mechanisms; Exercises: Solving multiple problems start-stop mechanism (0.4 ECTS)
14. Lectures: Financial and time monitoring of work in real time; Exercises: Creation of graphic production automation model (0.3 ECTS)

15. Lectures: Tools and infrastructure for automating workflows; Exercises: Automation creating an offer from a defined digital workflow (0.4 ECTS)

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☒	field work ☐
exercises on computers ☒	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☐	test report ☒	oral exam ☒	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☐	

Assessment and evaluation of students' work during classes and on the final exam:
Normative assessment.

Other:

Teaching process evaluation:

Student evaluation (survey) ☒
Other:

Refrences

Required: K. Pap: "Standardizacija i automatizacija grafičke proizvodnje u XML-u", Tiskarstvo 03,ISBN 953-199-016-6, UDK 655(082), 655.4 : 004. 738.5, Zagreb, 2003.
K. Pap: "XML u standardizaciji tiskarstva", str. 135-150, Tiskarstvo 03, Zagreb, 2003., ISBN 953-199-016-6, UDK 655(082), 655.4 : 004. 738.5 3.
K. Pap, V. Žiljak: "Model simulacije dinamičkog konfiguriranja grafičkih sustava", IV simpozij
Modeliranje u znanosti, tehnici i društvu., Rijeka 2000. UDK 519.8(082), ISBN 953-6065-00-2

Optional:

Name of the course: Color in the digital environment

Teacher: prof. PhD. Lidija Mandić

Associate teachers:

Lectures (L): Lidija Mandić

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+0

ECTS credits: 3

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Yes

Course objectives:Classification of parameters affecting color appearance. Explain the importance of modeling the chromatic model adaptations. Connect chromatic adaptation models with color appearance models. Explain models for image appearance

Enrollment requirements: no

Prerequisite for taking the course exam: no

General And Specific Competence and learning outcomes of the course:
Evaluation of the characteristics of prepress, printing, finishing and multimedia devices
Expected learning outcomes at the subject level explain the parameters that affect the appearance of colors compare the different ones chromatic adaptation models connect models for color appearance with application differentiate models for colors appearance from the image appearance model

Course content (Syllabus) on a weekly basis:

1. Experience of color and parameters that influence the experience of color;
2. Color characteristics that are included in the color appearance model,
3. Human visual system and adaptation
4. Parameters affecting color appearance
5. Parameters affecting color appearance

6. Color spaces
7. Device characterization
8. Device characterization
9. Models of chromatic adaptation
10. Models of chromatic adaptation
11. Models of chromatic adaptation
12. Color appearance model
13. Color appearance model
14. Model for image appearance
15. Image appearance model

Format of instructions:

lectures ☒	laboratory ☐	online ☒
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☐	test report ☐	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

preliminary exam - lectures; seminar on a given topic

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: preliminary test, independent research, scientific articles dealing with subject matter

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: materials placed on MERLIN

Optional: MD Fairchild. Color Appearance Models, Second edition. Chichester, UK: John Wiley and Sons, Ltd., 2005; Reinhard, Khan, Akyuz, Johnson, Color Imaging: fundamentals and Applications, A.K. Peters, 2008.

Name of the course: CtP technology

Teacher: prof. PhD. Sanja Mahović Poljaček

Associate teachers:

Lectures (L): Sanja Mahovć Poljaček

Seminar (S):Sanja Mahovć Poljaček, Tamara Tomašegović

Laboratory (LAB): Sanja Mahovć Poljaček, Tamara Tomašegović

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+1

ECTS credits: 6

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Yes

Course objectives: Definition of the CtP processes in production of printing plates. Defining the elements of the Computer to Plate (CtP) system of creating an image on the surface of the printing plates. Analysis of devices for imaging of printing plates and classification by architecture, radiation sources and by printing techniques. Defining and comparing different systems for making printing plates according to the technical solutions of the printing units and the structure of the printing plates. Distinguishing and evaluating existing technologies on the market and the possibility of their implementation in the different workflows.

Enrollment requirements: -

Prerequisite for taking the course exam: completed Labs and seminars, practical work and project

General And Specific Competence and learning outcomes of the course:
Knowledge and identification of technological segments of graphic prepress, classification and explanation CtP processes; planning the sequence of process procedures in graphic technology. After completing the course, the student can: define the CtP system for creating printing plates, classify and compare units for imaging of printing plates, compare and analyze different types of CtP printing plates, calculate the parameters of creating printing plates for different printing techniques, apply different tools for creating imposition and optimization of printing process, calculate and choose the type of printing plate considering the process parameters, analyze and evaluate the development of CtP technologies, work in a team, apply knowledge of a foreign language in the review of literature.

Course content (Syllabus) on a weekly basis:

1. Computer to Plate (CtP) workflow (0.25 ECTS)
2. Key elements in the CtP (0.25 ECTS)
3. Optimization of digital information for imaging process (0.25 ECTS)
4. Imaging devices - architecture, radiation sources (0.25 ECTS)
5. Adjustable imaging devices (0.25 ECTS)
6. CtP printing plates for intaglio printing (0.25 ECTS)
7. CtP printing plates for intaglio printing - electro gravure (0.25 ECTS)
8. CtP printing plates for flexographic printing (0.25 ECTS)
9. CtP printing plates for flexographic printing (0.25 ECTS)
10. CtP printing plates for offset printing (0.25 ECTS)
11. CtP printing plates for offset printing (0.25 ECTS)
12. CtP printing plates for screen printing (0.25 ECTS)
13. CtP printing plates for screen printing (0.25 ECTS)
14. Trends in CtP, non-process printing plates (0.25 ECTS)
15. Trends in CtP, non-process printing plates (0.25 ECTS)

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☐
activities in class ☒	test report ☒	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☒ Guessing and completion tasks	☐ Multiple choice tasks
☒ Alternative choice tasks	☐ Connecting and arranging tasks

☒ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam: colloquium (exercises) - checking the knowledge mastered in the exercises with knowledge of the necessary and completed tasks from the exercises; written colloquium (lectures) - possibility of taking the material segmentally, final exam - written and oral knowledge test.

Other: -

Teaching process evaluation: Anonymous survey

Student evaluation (survey) ☒
Other: -

Refrences

Required: R. M. Adams, , F. J. Romano, *Computer to Plate: Automating the Printing Industry*, GATFPress, Pittsburg, 1999; A. Pipes, *Production for Graphic Designers*, Laurence King Publishing, 2009.; H. Kipphan, *Handbook of Print Media*, Springer Verlag Berlin Heidelberg New York, Heidelberg, 2001; J. T. Lind, G. M. Radencic, *GATF Computer-To-Plate Performance Study*,Vol. 31, Gatf Research & Technology Reports, Printing Industries Press, 2002.

Optional: K. Johansson, P. Lundberg, R. Ryberg, *A Guide to Graphic Print Production, 3rd Edition*, Wiley, New York, 2011; J. Deemer, *Glossary of Graphic Communications*, 4th edition, GATFPress, Pittsburg, 2008.

Name of the course: Digital multimedia 2

Teacher: asst. prof. PhD. Tajana Koren Ivančević

Associate teachers:

Lectures (L): Tajana Koren Ivančević, Nikolina Stanić Loknar

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):Tajana Koren Ivančević, Trpimir Jeronim Ježić, Nikolina Stanić Loknar

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2

ECTS credits: 6

Study programme: Graduate Status of the course: Mandatory

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

Course objectives: Acquisition of basic knowledge in the field of video recording, processing and post-production, including animation for the creation of the opening and closing credits. In the course, students will learn how to use a video camera and by recording raw material in the studio and outdoors. Getting to know different video formats and video recording devices. It will be explained how to format the input of video material to the computer. The methods of video processing and editing will be explained. Inserting text and audio files into the video. Ways of removing the background in the recorded video material and adding the desired background, either static or mobile. Video tapes are designed in the same way. The final product of the subject is completely a self-made video work with its own background, subtitles and added sound.

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: fulfilling obligations in laboratory exercises

General And Specific Competence and learning outcomes of the course:
Students will be able to describe the process of making a video. Students will plan the video making process. They will be able to choose quality shots of recorded material. Students will be able to design the opening and closing credits video work. Students will be able to add transitions and effects in video creation. Students will make animations and incorporate them into the video work. Students will create new ideas and solutions in making video work. Students will act in teamwork.

Course content (Syllabus) on a weekly basis:

1. Getting to know the basic concepts of video. Selection of teams and topics of the final thesis (0.3 ECTS)
2. Digital video standards. Video capturing and basics of video processing. (0.3 ECTS)
3. Color video models. Frame size, frame and pixel ratios. Pixel shapes. (0.3 ECTS)
4. Concept of time. Number of frames per second. Manipulation of frames in video processing. (0.3 ECTS)
5. Video size and formats, distortion.
   Exercises - colloquium (0.7 ECTS)
6. Record types of video files. Exporting video files. (0.3 ECTS)
7. File sizes, target audience and medium, subsequent editing. (0.3 ECTS)
8. Optimization of video files, calculation of video file size with added audio track. (0.3 ECTS)
9. Video compression and decompression, impact on image quality. (0.3 ECTS)
10. Transitions when connecting different frames

    Exercises - colloquium (0.7 ECTS)
11. Introduction of text and audio files into the video. (0.3 ECTS)
12. Post-production (0.3 ECTS)
13. Designing and adding additional effects. (0.3 ECTS)
14. Exporting the final product with regard to the target audience and medium. (0.3 ECTS)
15. Presentation of the final product created by teamwork.

    Exercises - colloquium (1 ECTS)

Format of instructions:

lectures ☒	laboratory ☐	online ☒
seminars and workshops ☐	multimedia and internet ☒	field work ☒
exercises on computers ☒	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☒	practical work ☒
activities in class ☒	test report ☒	oral exam ☒	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☒ Multiple choice tasks
☒ Alternative choice tasks
☐ Connecting and arranging tasks
☒ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Students take three colloquiums during the semester. The written part of the exam can be waived by colloquiums.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☒

Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: N.Chapman, J. Chapman: Digital multimedia, Third edition, ISBN 13 978-0-470-51216-6, 2009 M. Christiansen: Adobe After Effects and Compositing Studio Techniques, ISBN-13: 978-0-321-83459- 1, 2013 T. & C. Meyer: Creating motion graphics with After Effects, ISBN 978-0-240-81415-5, 2010 Adobe After Effects CS6, Clasroom in a Book, ISBN -13:978-0-321-82243-7

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Photosensitive materials in graphic reproduction

Teacher: prof. PhD. Sanja Mahović Poljaček, assoc. prof. PhD Tomislav Cigula

Associate teachers:

Lectures (L): Sanja Mahovć Poljaček, Tomislav Cigula

Seminar (S):Sanja Mahovć Poljaček, Tomislav Cigula, Tamara Tomašegović

Laboratory (LAB):-

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+0

ECTS credits: 5

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Yes

Course objectives: The objectives of the course are to define the basic elements of the printing plates production system. Emphasis on photosensitive materials/layers, materials necessary for the production of different types of printing plates. Classification of photosensitive materials depending on the application and production of printing plates. Processing and functional properties of photosensitive layers as well as measurement possibilities. Application of instrumental analytical methods to materials used in graphic reproduction processes. Mastery of program support and the ability to assess the applicability of individual instrumental methods in the analysis of different types of materials for the production of printing plates.

Enrollment requirements: -

Prerequisite for taking the course exam: completed seminars, handed project

General And Specific Competence and learning outcomes of the course:
Planning the research methodology and the use of measuring devices in proving the set hypotheses; proposing new and functional solutions for graphic products with regard to materials and processes; evaluation and characterization of advanced image formation processes in graphic technology. After passing the course, the student will be able to: qualify the type of printing plate with regard to the photosensitive layer; apply different instrumental methods in the analysis of materials used in the graphic reproduction process, choose methods suitable for the analysis of different types of materials; master the program support and procedures used in instrumental analysis.

Course content (Syllabus) on a weekly basis:

1. Introduction to materials for making printing forms. Division and basic concepts, application (0.25 ECTS)
2. Structure of types of surfaces and materials in graphic technology (0.25 ECTS)
3. Photosensitive materials, classification and application, spectral sensitivity (0.25 ECTS)
4. Types of printing plates, conventional and digital - similarities and differences in production (0.25 ECTS)
5. Functional properties of printed plates with regard to application and materials (0.25 ECTS)
6. Photosensitive materials in production of gravure printing plates (0.25 ECTS)
7. Photosensitive materials in production of flexographic printing plates (0.25 ECTS)
8. Photosensitive materials in production of letterpress printing plates (0.25 ECTS)
9. Photosensitive materials in production of offset printing plates (0.25 ECTS)
10. Photosensitive materials in production of offset printing plates (0.25 ECTS)
11. Photosensitive materials in production of screen printing plates (0.25 ECTS)
12. Functional, chemical and mechanical properties of photosensitive layers (0.25 ECTS)
13. Possibilities of measuring and controlling the surface structures of printing plates (0.25 ECTS)
14. Instrumental methods of surface analysis. Division and basic concepts, application (0.25 ECTS)
15. Optical methods and application on photosensitive layers. Image analysis of 2D and 3D microscopic images (0.25 ECTS)

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☐

activities in class ☒ test report ☒ oral exam ☐ portfolio ☐
seminar work ☒ experimental work ☐ continuous knowledge examination ☐

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☒ Guessing and completion tasks ☐ Multiple choice tasks
☒ Alternative choice tasks ☐ Connecting and arranging tasks
☒ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
colloquium (exercises) - checking the knowledge mastered in the exercises with knowledge of the necessary and completed tasks from the exercises; written colloquium (lectures) - possibility of taking the material segmentally, final exam - written and oral knowledge test.

Other: -

Teaching process evaluation: Anonymous survey

Student evaluation (survey) ☒
Other: -

Refrences

Required: R. M. Adams, , F. J. Romano, *Computer to Plate: Automating the Printing Industry*, GATFPress, Pittsburg, 1999; A. Pipes, *Production for Graphic Designers*, Laurence King Publishing, 2009.; H. Kipphan, *Handbook of Print Media*, Springer Verlag Berlin Heidelberg New York, Heidelberg, 2001; J. T. Lind, G. M. Radencic, *GATF Computer-To-Plate Performance Study*,Vol. 31, Gatf Research & Technology Reports, Printing Industries Press, 2002; K. Johansson, P. Lundberg, R. Ryberg, *A Guide to Graphic Print Production, 3rd Edition*, Wiley, New York, 2011; J. Deemer, *Glossary of Graphic Communications*, 4th edition, GATFPress, Pittsburg, 2008.

Optional: D. A. Skoog, F. J. Holler, S. R. Crouch, *Principles of instrumental analysis,* Brooks/Cole Pub., šesto izdanje, 2006.; D. W. Ball: *The Basics of Spectroscopy*, SPIE Press, 2001. G. Currell, *Analytical Instrumentation: Performance Characteristics and Quality*, John Wiley & Sons, 2008.; E. Barsoukov (Editor), J. R. Macdonald (Editor), *Impedance Spectroscopy: Theory, Experiment, and Applications*, John Wiley & Sons, 2005.; J. Levy Vehel, E. Lutton (Eds.), *Fractals in Engineering New trends in Theory and Applications*, Springer Verlag London, 2005.

Name of the course: Mechanical simulations in computer animations

Teacher: Odaberite stavku. Sanja Kopilović Bjelovučić

Associate teachers:

Lectures (L): Sanja Kopilović Bjelovučić

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB): Tigran Jokić

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L + LAB Odaberite stavku.

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 1+0+2

ECTS credits: 4

Study programme: Graduatetavku.

Status of the course:Odaberite stavku.Mandatory/Elective course

Semester: Odaberite stavku. summer Semester number: Odaberite stavku. II

Possibility of teaching in English: Odaberite stavku. For foreign students

Course objectives: Mechanical simulations are an explosive area in the interactive computer graphics development industry, mainly computer games, as well as in the industry of developing "image by image" 3D graphics. Companies that are hiring animators, they are increasingly looking for those who know mechanics. Those skills can transform someone with very little or even no programming experience, and a passion for 3D graphic design, into a professional in high demand on the modern IT market.

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: Completed colloquiums and tests following lectures, and attended exercises

General And Specific Competence and learning outcomes of the course:
Students will know: the basics of the field of mechanics necessary to understand the parameters that should be adjusted to create existing types of mechanical simulations in 3D animation programs, basics of creating simulations of deformable and non-deformable bodies, systems of particles, living and non-living system, as well as the basics of creating a simple game in one of the programs for 3D modeling and animation (Blender/3dsMax/Maya).

Course content (Syllabus) on a weekly basis:

1. Introductory lecture (defining the rights and duties of students, necessary accessories and materials which should be brought to lectures, definition of literature) and introduction to mechanical simulations in computer animations, in general.

Development and brief history of computer animations. 3D system configurations for animations. A selection of current hardware and software. Mechanics in real-time and frame-by-frame computer graphics: an introduction, simple examples in current 3D tools (Blender/3ds Max, Maya). 3D objects. 3D scenes. Movement.
(0.13 ECTS)

Introductory exercises (defining the rights and duties of students). Introduction to Blender or a similar 3D program: interface, coordinate systems, basic commands; making of simple 2D and 3D animations.
(0.13 ECTS)

2. Lecture: Non-deformable objects. Collision detection. Clips. Collision response. Elastic and inelastic collisions. Coefficient of restitution. Simulations of non-deformable objects. Lecture follow-up test.
(0.13ECTS)

   Exercises: Problem solving tasks from lectures in Blender or a similar 3D program.(0.13 ECTS)

3. Lecture: Systems of masses and springs. Harmonic motion, Hooke's law. Simulations deformable objects (fabric). Lecture follow-up test.
(0.13ECTS)

   Exercises: Problem solving tasks from lectures in Blender or a similar 3D program.(0.13 ECTS)

4. Lecture: Systems of particles and their interactions - settings of particles. Interaction of particles with objects and forces. Using particles to simulate fire. Lecture follow-up test.
(0.13ECTS)

   Exercises: Problem solving tasks from lectures in Blender or a similar 3D program.(0.13 ECTS)

5. Lecture: Using particles and groups of vertices to simulate hair and grass. Tracking test lectures.
(0.13ECTS)

   Exercises: Problem solving tasks from lectures in Blender or a similar 3D program.(0.13 ECTS)

6. Lecture: Repetition of material and preparation for colloquium I.
(0.13 ECTS)

   Exercises: Repetition of material and preparation for colloquium I.
(0.13 ECTS)

7. Lecture: Colloquium I.
(0.13 ECTS)

   Exercises: Colloquium I.
(0.13 ECTS)

8. Lecture: Evaluation of colloquium results I. Oral knowledge test of students who are dissatisfied with the grade. Grading according to the created rubric (grading criteria). Evaluation of the teaching process (survey by students).
(0.13ECTS)

   Exercises: Evaluation of colloquium results I. Oral knowledge test of students who are dissatisfied grade. Grading according to the created rubric (grading criteria). Process evaluation teaching (survey by students).
(0.13ECTS)

9. Lecture: Lecture follow-up test.
(0.13ECTS)

   Exercises: Problem-solving tasks from lectures in Blender or a similar 3D software.(0.13 ECTS)

10. Lecture: Fluid simulations. Basics of fluid dynamics.
(0.13ECTS)

    Exercises: Problem-solving tasks from lectures in Blender or a similar 3D software.
(0.13 ECTS)

11. Lecture: Plotting raster images and MPEG/AVI movies.
(0.13ECTS)

    Exercises: Problem solving tasks from lectures in Blender or a similar 3D software.
(0.13 ECTS)

12. Lecture: Basics of game engine in Blender or similar 3D software (simulations in real time) and making a simple game. Tracking test lectures.
(0.13ECTS)

    Exercises: Problem solving tasks from lectures in Blender or a similar 3D software.(0.13 ECTS)

13. Lecture: Repetition of material and preparation for colloquium II.
(0.13 ECTS)

    Exercises: Repetition of material and preparation for colloquium I.
(0.13 ECTS)

14. Lecture: Colloquium II.
(0.13 ECTS)

Exercises: Colloquium II.
(0.13 ECTS)

15. Lecture: Evaluation of the results of colloquium II. Oral examination of the knowledge of students who are dissatisfied with the grade. Grading according to the created rubric (grading criteria). Evaluation of the teaching process (survey by students).
(0.13ECTS)

Exercises: Evaluation of colloquium results II. Oral examination of the knowledge of students who are dissatisfied grade. Grading according to the created rubric (grading criteria). Process evaluation teaching (survey by students).
(0.13ECTS)

Format of instructions:

lectures ☐	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☐	project ☐	practical work ☐
activities in class ☐	test report ☐	oral exam ☐	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other: Assessment and evaluation of students' work during classes and on the final exam: Normative assessment (examination is longer and larger units, tasks, average weights are examined).

Assessment and evaluation of students' work during classes and on the final exam:
Kliknite ili dodirnite ovdje da biste unijeli tekst.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐ x
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: 1. Pandžić, I. et al., Virtualna okruženja, Element, Zagreb, 2011. 2. Parent, R. et al., Computer Animation Complete, Morgan Kaufman Publishers, Elsevier Inc., Burlington, MA, USA, 2000. 3. Chronister, J., Blender Basics, Classroom Tutorial Book, 4th Edition, work licensed under a Creative Commons Attribution-Noncommercial-Share Alike 3.0 Unported License, at http://www.cdschools.org/cdhs/site/default.asp, 2011.

Optional: 1. Jecić, S.: Kinematika krutih tijela, Udžbenik Sveučilišta u Zagrebu, Zagreb, 2002.

Name of the course: Optical measuring methods of printing surfaces

Teacher: prof. PhD. Vesna Džimbeg-Malčić

Associate teachers:

Lectures (L): Vesna Džimbeg-Malčić

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):Vesna Džimbeg-Malčić

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+1

ECTS credits: 4

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

Course objectives:The course provides students with knowledge of methods for testing optical properties of various types of printing surfaces, both unprinted and printed, and enables them to plan research methodology and use measurement devices to test hypotheses. In laboratory exercises, students apply the knowledge acquired in the curriculum, which is continuously linked to the basic knowledge of the course during all forms of teaching.

Enrollment requirements: /

Prerequisite for taking the course exam: completing laboratory exercises

General And Specific Competence and learning outcomes of the course:
1) Describe the correlation between mutually dependent physical quantities and apply them to real situations in graphic reproduction; 2) Use computer programs for statistical analysis and graphic presentation of data; 3) Observe, record, and analyse data obtained from laboratory experiments; 4) Create measurement conditions to assess the stability of printing surfaces; 5) Use relevant standards to assess the quality of printing surfaces through their optical characteristics; 6) Interpret the reflection spectra of printing surfaces and dyes; 7) Apply the Kubelka-Munk model to calculate the absorption and scattering coefficients on measured printing surfaces, whether recycled or not; 8) Describe spectrophotometers and recognize when/how to use them in graphic reproduction; 9) Analyse the interaction of light and the printing substrate based on physical models, understand the optical/mechanical dot gain; 10) Using simple physical models (Murray-Davies and Yule-Nielsen), explain the interaction of light with the printed substrate; 11) Define accelerated aging (degradation of printing surfaces under controlled conditions) and natural aging.

Course content (Syllabus) on a weekly basis:

1. Introduction. Electromagnetic radiation, spectrum. Radiation energy. Radiation sources. Impact of electromagnetic radiation on the environment. Visible radiation. Perception of visible radiation. Thermal radiation. Ultraviolet radiation. Microwaves. Radio waves. X-ray radiation. Gamma radiation and cosmic rays.
2. Emission and absorption spectra. Spectra characteristics. Spectra of gases, liquids, and solids. Spectroscopy principals. Types of spectrometers; prism and diffraction grating. Standard sources of light.
3. Reflection of electromagnetic radiation on a completely opaque surface; surface, specular reflection. Printing substrates and surface reflection. Coated and uncoated surfaces. Reflectance curves in the visible part of the spectrum and the structure of the printing surface.
4. Scattering of light within bound particles; turbid media. Kubelka-Munk theory of scattering and its application in the examination of the optical properties of printing surfaces. Reflectance, scattering, and absorption spectra. The relationship between scattering and structure, types, substrates.
5. Murray-Davies and Yule-Nielsen improved theory of scattering.
6. Scattering on non-recycled and recycled substrates. Analysis of particle impurities in printing substrates.
7. Scattering and colored substrates, papers. Reflectance curves and factors of scattering and absorption. Limitations of the Kubelka-Munk theory of scattering on recycled and fully colored substrates.
8. Scattering and types of printing substrates (transparent/opaque).
9. Scattering and related optical properties of printing surfaces. Brightness, opacity, and lightfastness. Introduction to optical measurement standards; ISO, TAPPI.
10. Fluorescence; explanation of the phenomenon. Detection of the phenomenon in reflectance measurements. Fluorescent materials.
11. Aging and stability of printing surfaces. Visible and UV radiation. Selection of specific radiation sources and measurement of radiation energy.
12. Stability of printing surfaces and the influence of humidity and temperature. The effect of substrate acidity on stability. Accelerated and natural aging.
13. Physical changes within the substrate caused by aging.
14. An overview of selected testing methods. Analysis of all student results in the group.
15. Familiarization with literature data on proposed methods and suggestions for new contents for testing printing surfaces.

Format of instructions:

lectures ☒	laboratory ☒	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☐	test report ☒	oral exam ☒	portfolio ☐
seminar work ☒	experimental work ☒	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☒

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks
☐ Alternative choice tasks ☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Kliknite ili dodirnite ovdje da biste unijeli tekst.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☒

Other:

Refrences

Required: P. Kulišić i V. Lopac : Elektromagnetske pojave i struktura tvari, Školska knjiga, Zagreb, 2003. 2. H. Kipphan: Handbook of Print Media: Technologies and production methods, Berlin, Springer, 2001.,3. N. Pauler: Paper optics, AB Lorentzen & Wettre, Sweden, 2001.

Optional: /

Name of the course: Optoelectronic systems 2

Teacher: prof. PhD. Lidija Mandić

Associate teachers:

Lectures (L): Lidija Mandić

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):Ana Agić

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2

ECTS credits: 6

Study programme: Graduate Status of the course: Mandatory / Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Yes

Course objectives:learn about new technologies, know the principle of operation and application, distinguish between technologies and recognize their application

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: exercises done

General And Specific Competence and learning outcomes of the course:
explain the principle of device operation, evaluate devices of the same type according to characteristics, choose devices according to the purpose, to independently research with the aim of lifelong learning

Course content (Syllabus) on a weekly basis:

1. Various LED technologies
2. New screen technologies
3. Principle of 3D monitor operation
4. Touch screens
5. Touch screen technologies
6. Touch screen technologies
7. Wireless technologies

8. Working principle of RFID
9. Application of RFID
10. NFC and application
11. Motion sensors
12. Comparison of different motion sensors
13. Printed electronics
14. Printed electronics
15. New technologies

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☐	project ☐	practical work ☒
activities in class ☐	test report ☒	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
colloquium, practical work, seminar

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: text on MERLIN

Optional: Miles, Sarma and Williams: RFID Technology and ApplicationsCambridge University Press, 2010; Saleh, Teich, Fundamentals of photonics, Wiley, 2007.; Scientific articles

Name of the course: Packaging

Teacher: prof. PhD. Diana Milčić

Associate teachers:

Lectures (L): Milčić

Seminar (S):Milčić

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1

ECTS credits: 5

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Yes

Course objectives:The aim of the course is to acquire basic and professional knowledge in the field of packaging and to train students for selection suitable packaging equipment depending on the product and form of packaging.

Enrollment requirements: No

Prerequisite for taking the course exam: NO

General And Specific Competence and learning outcomes of the course: 1. Describe the components of the packaging value chain, and demonstrate how these influences the design of packages komponente 2. Design the variants of packaging for different levels of packing and recommend the most suitable; 3. Select suitable materials and technology for the manufacturing of a particular type of packaging; 4. Recommend the packing machines and equipment.

Course content (Syllabus) on a weekly basis:

1. Classification of packaging and packaging machines.
2. Supply of packaging lines.
3. Lines for packaging in flexible packaging.
4. Lines for packing liquid substances.
5. Lines for packing bulk substances.

6. Closing the packaging.
7. Lines for filling cardboard packaging.
8. Quality control systems on packaging lines.
9. Containers and transport systems on packaging lines.
10. Drive and control parts of packaging lines.
11. Final packaging operations: wrapping and palletizing.
12. Packaging system design: necessary equipment.
13. Computer support for packaging system design.
14. Designing the packaging system: term and financial plans.
15. Integration of treated thematic units.

Format of instructions:

lectures ☒	laboratory ☐	online ☒
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☐	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☐	test report ☐	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☒

Objective-type tasks (multiple items can be selected):

☒ Guessing and completion tasks	☒ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☒ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Kliknite ili dodirnite ovdje da biste unijeli tekst.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: . Henry, J. R., Packaging machinery handbook, John R. Henry, 2012 2. Henry, J. R., Machinery matters, John R. Henry, 2011 3. Emblem, A., Emblem, H., Packaging technology, Woodhead Publishing, 2012

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Business and security printing

Teacher: assoc. prof. PhD. Igor Zjakić

Associate teachers:

Lectures (L): Igor Zjakić

Seminar (S):Igor Zjakić

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+0

ECTS credits: 6

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

Course objectives: To teach students on methods of print protection against counterfeiting
Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: Kliknite ili dodirnite ovdje da biste unijeli tekst.

General And Specific Competence and learning outcomes of the course:
In the course, students learn about the methods of security printing and ways to fight against counterfeiting. Levels of protective printing. Protection with materials. Printing of optically variable media. Printing techniques in protective printing. Printing of iridescent and non-irradiating optically variable media. Printing of a "hidden" image. Intaglio printing. Water mark. Printing with magnetic colors. Printing with conductive inks. Tangential lighting. Printing with luminescent colors. Positive metamerism in protective printing. Printing methods of inducing positive metamerism for the purpose of protecting the graphic product. Protective printing with a combination of line structure and frequency modulated raster. Image and data synthesis with background. Negative phenomena that make security printing difficult. Gioche printing. Printing limitations for giosha printing. Printing with special colors. Different luminescence at different viewing angles in printing with luminescent inks. Printing with thermostable colors. Printing with optically variable colors. Microprinting. Microperforation

Course content (Syllabus) on a weekly basis:

1. The needs of business and security printing. Realization of technical and technological conditions for security printing.
2. The need for protection against counterfeiting. Trends in the world.
3. Possibility of reproduction. Methods of print quality control in indirect dry offset. Methods of security printing. Levels of security printing.

4. Printing of a "hidden" image. Intaglio printing. Water mark. Printing with magnetic colors. Printing with electrically conductive paints.
5. Printing with special colors. Different luminescence at different viewing angles in print luminescent colors.
6. Printing methods on materials with security microperforation
7. Security with materials. Printing of optically variable media. Printing techniques in security printing. Printing of iridescent and non-irradiating optically variable media.
8. Tangential lighting. Correlation of visual sensitivity and matrix fineness. Luminescent printing colors. Positive metamerism in security printing. Printing methods of eliciting a positive metamerism for the purpose of security the graphic product.
9. Security printing with a combination of line structure and frequency modulated raster. Image synthesis and data with a background. Negative phenomena that make security printing difficult. Gioche printing.
10. Printing limitations for gioshe printing. Gioche printing control methods. Playback optimization at gioshe printing
11. Printing with thermostable colors. Printing with optically variable colors. Holograms. Methods of hologram applications.
12. Printing of images made of diffraction gratings. Printing means of diffraction structure effects continuous movement with a 3D effect.
13. Printing of metallized and demetallized elements based on variable optics.
14. Printing on mother-of-pearl security materials.
15. Printing of postage stamps. Microprinting.

Format of instructions:

lectures ☒	laboratory ☒	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☒	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☒	test report ☐	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☒ Guessing and completion tasks	☒ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Assessment and evaluation of student work during classes and at the final exam

Other: Assessment and evaluation of students' work during classes and on the final exam: Students complete a project assignment that is a requirement for the exam.
Teaching process evaluation: Ways of monitoring quality that ensure the acquisition of knowledge, skills and competencies: Quality is monitored by monitoring the independence of work, during the course and afterwards.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required:. A. Williams, Security Printing, Govt. Press, 2000

Optional: K. Nitsche, Counterfihhting, VDM Verlag Dr. Muller, Usa, 2007

H. Kiphan: Handbook of Print media, Springer, 2001.

Name of the course: Restauration and preservation of paper

Teacher: prof. PhD. Branka Lozo

Associate teachers:

Lectures (L): Kliknite ili dodirnite ovdje da biste unijeli tekst.

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2 + 0 + 0

ECTS credits: 4

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

Course objectives: The goal of the course is to bring students closer to the topic and significance of the restoration of printed heritage, to guide them to the possible causes of damage, to show the ways to prevent further deterioration, to present postulates of restoration, primarily the reversibility of any intervention as well as the absence of destructive methods. An additional goal of the course is to make them aware of the value of printed heritage and to introduce them to the institutions that take care of it.

Enrollment requirements: Finalised pre-graduate study in graphic technology or any similar study.

Prerequisite for taking the course exam: Kliknite ili dodirnite ovdje da biste unijeli tekst.

General And Specific Competence and learning outcomes of the course:
Students will be able to explain the basic postulates of the restoration processes; They will know how to list and describe the causes of damage and deterioration of printed heritage; They will know how to group the causes of damage of printed heritage; They will know how to list the procedures when taking over material for restoration; They will be able to determine the sequence of procedures during restoration; They will be able to list and explain the characteristics of the building in which the printed heritage is stored as well as the requests for the storage of printed heritage; They will know to identify the most important institutions for the care of printed heritage.

Course content (Syllabus) on a weekly basis:

1. Introduction, importance of restoration, most important terms, aging of paper and paper materials.

2. The influence of storage conditions on material aging.
3. Variety of influences on the aging process of paper with regard to the composition of the paper.
4. Causes of accelerated aging of paper materials.
5. Types of damage: chemical damage to paper materials and printed heritage.
6. Types of damage: mechanical damage to paper materials and printed heritage.
7. Biological damage: moisture and molds.
8. Biological damage: microorganisms and pests.
9. Disassembly into elementary sheets, dry and wet cleaning, washing.
10. Replacing of missing parts, replacement materials, manipulation of restored papers.
11. Restoration of the binding.
12. Restoration of the book cover.
13. Specifics of the protection of newspaper material, specifics of the protection of geographical maps.
14. Canning and storage. Preventive protection of written heritage. Rescue from disasters.
15. Conditions of buildings and rooms for storage, conservation before and after restoration.

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☒
exercises on computers ☐	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☐	project ☐	practical work ☐
activities in class ☒	test report ☐	oral exam ☐	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☒

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks
☐ Alternative choice tasks ☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Students are offered the option of taking an exam through a mid-term exam (2 or 3 during the semester) provided that every mid-term exam is positively evaluated. Students can also take the exam during regular exam periods (written and oral)

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Regular self-evaluation as well as evaluation by students.

Student evaluation (survey) ☐
Other: Students' survey

Refrences

Required: 1. Predavanja nastavnika na mrežnim stranicama katedre
2. Laszlo Ž, Dragojević A , Priručnik preventivne zaštite umjetnina na papiru, Crescat, Zagreb, 2010
3. Dragojević A, Preventivna zaštita umjetnina na papiru, HRZ, Zagreb, 2010 D.
4. Pilipović, Restauriranje zemljopisnih karata, Arh. vjesn., god. 41, 1998

Optional: 1. I. Kozjak, Spašavanje arhivskoga gradiva nakon katastrofa: nove mogućnosti Središnjeg laboratorija za prvu konzervaciju i restauraciju Hrvatskog državnog arhiva, Arh. vjesn., god. 53, 2010
2. Vesna Milcic Trajbar: Zaštita starih novina na novim medijima. Zbornik referatov v dopolnilnega izobraževanja, Maribor 1/2002
3. T. Mušnjak, Arhivi: Između digitalnih zapisa i ubrzanog propadanja gradiva na kiselom papiru, Arh. vjesn., god. 44, 2001

Name of the course: Surface phenomenon on printing forms

Teacher: asst. prof. PhD. Tomislav Cigula

Associate teachers: PhD. Tamara Tomašegović

Lectures (L): asst. prof. PhD. Tomislav Cigula

Seminar (S):asst. prof. PhD. Tomislav Cigula, PhD. Tamara Tomašegović

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+0

ECTS credits: 5

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Yes

Course objectives:To define and analyse surface phenomena which are specific for printing forms. To choose measurement methods which enable characterization of materials and processes in printing forms production. To evaluate influence of the processing parameters. To optimize printing forms production. To determine composition of fluids in the printing processes for the highest functionality.

Enrollment requirements: None

Prerequisite for taking the course exam: Attending seminars and making of project assignment.

General And Specific Competence and learning outcomes of the course:
Proposing new and functional solutions for graphic products having in mind used materials and production processes of printing forms; evaluation and characterization of advanced imaging processes in graphic industry; implementation of the eco-system in graphic processes; optimization of processing steps in graphic reproduction. After finishing the course, the student can: define and classify surface phenomena in the graphic industry; analyse and evaluate the influence of the material and its surface treatment on functionality in graphic reproduction processes; explain and evaluate physicochemical properties of fluids and the parameters that affects them; choose and apply measurement methods in surface properties analysis, evaluate the material processing and propose optimization solutions, propose additives ratio in liquids to increase functionality; evaluate and elaborate modification of material processing; literature search related to materials for the production of printing forms.

Course content (Syllabus) on a weekly basis:

1. Definition of surfaces, surface phenomena on printing forms
2. Adsorption in graphic reproduction processes
3. Wetting in graphic reproduction processes
4. Methods of determining the wetting degree on the surfaces of the printing form
5. Capillarity in graphic reproduction processes
6. Mechanical properties of surfaces, structure related topography of solids
7. Surface roughness, roughness parameters
8. Methods for determining roughness parameters
9. Processes of printing forms production that affect the change in the roughness of the material
10. Physico-chemical properties of liquids in the graphic industry
11. The role and composition of the wetting solution
12. Surfactants
13. Methods for determining the surface properties of liquids
14. Methods for determining the free surface energy of materials
15. Parameters affecting solid-liquid interaction

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☒	practical work ☐
activities in class ☒	test report ☒	oral exam ☒	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☐ Multiple choice tasks
☐ Alternative choice tasks
☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam: Evaluation of students' activities during classes (seminars and lectures); seminars - presentation of knowledge mastered in lectures with knowledge of necessary and completed tasks; written exam (lectures) - possibility of writing exam partially, final exam - written and oral knowledge test.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☒
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: K. L. Mittal, Contact Angle, Wettability and Adhesion, Volume 5, VSP, Leiden, 2008; S. Hartland, Surface and Interfacial Tension: Measurement, Theory and Applications, Marcel Dekker, 2004; H. Kipphan, Handbook of Print Media, Springer Verlag Berlin Heidelberg New York, Heidelberg, 2001; P. C. Hiemenz. R. Rajagopalan, Principles od Colloid and Surface Chemistry, Third Edition, Marcel Dekker, New York, 1997; P. Atkins, J. de Paula, Atkin\'s Physical Chemistry, 8th edition, Oxford University Press, Oxford 2006.

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Computer graphics

Teacher: Associate Professor Ivana Žiljak Stanimirović, Ph.D.,
Asst. prof. Nikolina Stanić Loknar, Ph.D.

Associate teachers:

Laboratory (LAB): Marko Maričević, mag.ing.graph.tech.; Željko Bosančić, mag.ing.graph.tech.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L + LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 1+0+2
Lectures (15 hours), Laboratory exercises (30 hours)

ECTS credits: 4.0

Study programme: Graduate Study

Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: for foreign students

Course objectives:
Integrating and developing new knowledge from individualized computer vector and pixel graphics in sophisticated software solutions. Implementation and realization of computer graphics through conventional graphic technologies and new media. Connecting languages and graphics in systems: PostScript, HTML, SVG, XML and mutual transition in graphic standards. Programming of dynamic deformation of 2D and 3D shapes and stochastic transformation of computer graphics. The subject integrates knowledge from computer vector and pixel graphics in sophisticated individualized software solutions for conventional graphic technologies and the form of new media. The development and classification of computer graphics from its beginnings to modern software solutions is explained. Image recording, coding in RGB, CMYK, L*a*b, HSB systems are compared. Mathematical modeling of the raster cell is carried out. Individualized solutions of vector and pixel graphics are defined. Color settings are programmed to translate from visual to print mode. Programming languages for artistic computer graphics are related. Stochastics are embedded, random sequence generation, application to geometric shapes. Graphics are created with a computer using an algorithm of conventional description of geometric 2D and 3D shapes. Animation is carried out and morphology of computer models. Dynamic graphics and floating elements for microlenses are being programmed. Graphics in systems: PostScript, HTML, SVG, XML. Preparation for printing of individualized computer graphics on different materials and formats. Preparation and standardization of computer graphics for the web environment. Creation of computer graphics publication for web edition and for print application. Differentiation of preparing computer graphics for magazines, books, internet. Computer

graphics in animation and programming of dynamic deformation, stochastic transformation of computer graphics in time. Methods of image compression in vector and pixel format and mutual transition in graphic standards.

Enrollment requirements: basics of working with a computer in a Web 2.0 environment.

Prerequisite for taking the course exam: class activity, online activity, exercise assignments, presentation

General and Specific Competence and learning outcomes of the course:
- developing individualized computer vector and pixel graphics in sophisticated software solutions,
- designing dynamic deformation of 2D and 3D shapes and pseudo-random transformation of computer graphics,
- implementation and realization of computer graphics through conventional graphic technologies,
- preparation and standardization of computer graphics for the web environment and creation of dynamic records for the Internet,
- connecting language and graphics in code systems: PostScript, HTML, SVG, XML and mutual transition in graphics standards,
- creating a computer graphics system for microlenses,
- independent creation of new computer graphics in a technological and artistic environment,
- creation of computer graphics publication for web edition and for print application.

Course content (Syllabus) on a weekly basis:

1. L: The lecture provides an overview of computer vector and pixel graphics in with sophisticated individualized program solutions for conventional graphic technologies and the form of new media.
   LAB: In the exercises, he gets acquainted with the programming language for the development of new knowledge in individualized computer vector and pixel graphics.
   0.2 ECTS

2. L: The lecture explains the development and classification of computer graphics from its beginnings to modern software solutions.
   LAB: Computer graphics, PostScript elements, stochastics are programmed in the exercises.
   0.3 ECTS

3. L: Mathematical modeling of a raster cell is carried out in the lecture.
   LAB: In the exercises, mathematical modeling of the raster cell is carried out
   0.3 ECTS

4. L: Defining and designing individualized solutions of vector and pixel graphics.
   LAB: In the exercises, individualized solutions of vector and pixel graphics are designed.
   0.2 ECTS

5. L: Comparison of image records, coding in RGB, CMYK, L*a*b, HSB systems. Programming color settings for translation from visual to print mode.
   LAB: In the exercises, coding is carried out through the PostScript language in RGB, CMYK, L*a*b, HSB systems.
   0.2 ECTS

6. L: Linking programming languages for artistic computer graphics. It is installed stochastics, random sequence generation, application to geometric shapes.
   LAB: In the exercises, new individualized computers are designed graphic.
   0.3 ECTS

7. L: Designing graphics with a computer using the conventional description algorithm geometric 2D and 3D shapes. Animation and morphology of computer models is carried out.
   LAB: In the exercises, programming of dynamic deformation of 2D and 3D shapes and stochastic transformation of computer graphics is carried out.
   0.3 ECTS

8. L: Interpretation of microlens systems and applications in computer graphics. They are programmed dynamically graphics and floating elements for microlenses.
   LAB: During the exercises, microlenses with application in computer graphics are programmed and tested.
   0.3 ECTS

9. L: Graphics in systems: PostScript, HTML, SVG, XML.
   LAB: The exercises involve connecting graphics in the following systems: PostScript, HTML, SVG, XML.
   0.2 ECTS

10. L: Preparing for printing individualized computer graphics on different materials i formats.
    LAB: In the exercises, the preparation of computer graphics in printing standards is carried out.
    0.2 ECTS

11. L: Prepress of computer graphics for magazines, books, internet.
    LAB: In the exercises, computer graphics are prepared in standards for display on the screen.
    0.3 ECTS

12. L: Preparation and standardization of computer graphics for the web environment.
    LAB: During the exercises, the preparation of computer graphics for application and realization through new media is carried out.
    0.3 ECTS

13. L: Creating a computer graphics publication for web edition and print application.
    LAB: In the exercises, a computer graphics publication template is created.
    0.3 ECTS

14. L: Computer graphics in animation and dynamic deformation programming, stochastic transformations of computer graphics in time.
LAB: The exercises involve animation of computer graphics, dynamic deformation, stochastic transformation of computer graphics in time.
0.3 ECTS

15. L: Methods of compressing images in vector and pixel format and mutual transition in graphics standards.
LAB: In the exercises, the connection of language and graphics in vector and pixel notation and mutual transition in graphic standards is carried out.
0.3 ECTS

Format of instructions:

lectures ☒ laboratory ☒ online ☒
seminars and workshops ☐ multimedia and internet ☒ field work ☐
exercises on computers ☒ independent assignments ☒ work with mentor ☒
other: ☐

Monitoring of students' work:

attending classes ☒ research ☒ project ☒ practical work ☒
activities in class ☒ test report ☒ oral exam ☒ portfolio ☐
seminar work ☐ experimental work ☒ continuous knowledge examination ☒

Type of written examination:

Essay type assignment ☐
Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☐ Alternative choice tasks
☐ Multiple choice tasks
☒ Connecting and arranging task
☒ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Evaluation of student activities; work on exercises, project tasks, research, presentations. Midterm, written, oral exam.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Official survey

Student evaluation (survey) ☒

Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required:
- Vilko Žiljak, Klaudio Pap: "POSTSCRIPT programming of graphics", FS, Zagreb, 1998. ISBN: 953 - 199 - 000
- Klaudio Pap, Jana Žiljak Vujić, Ivana Žiljak: "DESIGN OF DIGITAL SCREENING", // FS, Zagreb, 2008. ISBN 978-953-7064-10—5, NSK: 667861, p120 international review:, Darko Agić, Hr, Andrew Tribute, Eng. Books are available on the web.

Optional:
- Dora Kinert, V. Žiljak: "Computer graphics", FS, Zagreb, 1996.
- Computer graphics,// Ex Machina - early computer graphics until 1979, the Franke collections and other foundations in the Kunsthalle Bremen. pp:291,482,483. Deutscher Kunstverlag, 2007. ISBN 978-3-422-06689-2
- Jeffrey J. McConnell: „Computer Graphics: Theory Into Practice“, 2006., Jones and Barltlett Publishers Inc, USA ISBN: 0-7637-2250-2-
Books are available on the web.

Methods of quality monitoring that ensure the acquisition of output knowledge, skills and competences:

Quality monitoring includes the analysis and evaluation of student achievements, project tasks on exercises and research activities with the aim of achieving the expected learning outcome.

Name of the course: Reengineering in graphic production

Teacher: assoc. prof. PhD. Dubravko Banić

Associate teachers:

Lectures (L): assoc. prof. PhD. Dubravko Banić,

Seminar (S):assoc. prof. PhD. Dubravko Banić, Iva Šarčević B.Sc. Eng.

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+2+0

ECTS credits: 6

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: No

Course objectives:Course objective is to acquire basic and specialized knowledge in the field of reengineering of graphic production processes and optimization of the machinery of a graphic company. For the successful implementation and management of reengineering, knowledge of the Kaizen and Lean Production principles of action will be used. Their implementation in different forms of graphic production is analyzed. Green Business is anticipated in the design of a new process or the redesign of an old one, probably the implementation of an ERP system and the advantages of such a way of working, i.e. production, are analyzed. During the semester, students prepare a comprehensive project work, demonstrating their readiness for research and independent action. At the same time, they acquire knowledge about working in teams, leading a team, and implementing new systems into existing systems in graphic production. Students research and analyze how similar projects are implemented in culturally different areas (Japan, Scandinavia and other industrially developed countries).

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: Attendance of classes (80%) and finished project

General And Specific Competence and learning outcomes of the course:
Formulating and systematizing problems in graphic technology and defining the hierarchy of their solution. Planning of research methodology to solve the set task. Preparing complex project tasks to create a graphic product, taking into account resources. Proposing new and functional solutions for graphic products in terms of materials and processes. Valorisation of the elements of each phase of the implementation of the plan in relation to the set task

(research plan, production, design). Planning and evaluation of development steps in accordance with the development of graphic technology.

Course content (Syllabus) on a weekly basis:

1. Basic definitions, divisions, implementation of reengineering in graphic technology. /Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
   Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

2. Basic KAIZEN principles of action and the advantages of the KAIZEN approach when designing a graphics company.
   / Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
   Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

3. Basic Lean production and the possibility of implementation when designing the printing department within a graphic company.
   /Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
   Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

4. Basic Lean production and the possibility of implementation when designing department of processes in print finishing within a graphic company.
   /Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
   Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

5. Concept of motivation and methods for improving motivation for work.
   /Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
   Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

6. Methods of managing the design project of the printing department within a graphic company.
   /Independent preliminary preparation for the lecture and assigned homework on that

topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

7. Methods of managing the design project of the department for processes in print finishing within a graphic company.
/Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

8. Advantages of fractal organization and the design of departments according to the fractal organization model of a graphics company.
/Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

9. Basic Just-in-time (right on time) principles of production.
/Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

10. Ways of decision-making and decision-making when designing a graphic company.
/Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

11. Approach to teamwork in production.
/Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

12. Basic strategies for designing a graphic company
/Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)

Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

13. Basic ERP systems when designing a graphic company.
/Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

14. Analysing different cases of designing a graphic company.
/Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

15. Basic system optimizations of a graphics company.
/Independent preliminary preparation for the lecture and assigned homework on that topic. Lectures – lecture and analysis of multiple competence acquisition examples. (0,25 ECTS)
Seminars – individual and group work on a task concerning the lecture topic and project (0,15 ECTS)

Format of instructions:

lectures ☒	laboratory ☐	online ☒
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☐
activities in class ☒	test report ☐	oral exam ☐	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks
☐ Alternative choice tasks ☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Overall grade: assignment grade and project assignment grade. There are 14 assignments for the seminar and 14 assignments for the preparation of listening to the teaching unit. For the project assignment, the student must: 1. elaborate the work phases and research methodology, 2. submit a detailed original project solution on the given topic, 3. present the project assignment orally. The total grade is the sum of the grades of the assignments at the seminar (40% of the total grade), the assignments for the preparation of listening to the teaching unit (10% of the total grade) and the project assignment (50% of the total grade). The conditions for access to the oral presentation of the project assignment are positively evaluated and submitted all assignments for the preparation of listening to the teaching unit, 90% of the assignments at the seminar and the project assignment.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐
Other: Student poll. In addition to poll defined by ISVU, upon course completion students are participation in a poll which examines: activity of lecturers and students during classes, evaluation of the usefulness of classes and improvement suggestions. Statistical report contains student activity, attendance of classes, fulfilment of duties, colloquium and final grades.

Refrences

Required: K. Helmut, ¨Handbook of Print Media Technologies and production methods¨, Springer, 2001. G. M. Hammer, J. Champy Reinženjering tvrtke, Mate d.o.o., Vinko Gačnik – Ferdo Vodenik, Projektiranje teknoloških proces, Golden marketing-tehnička knjiga , Zagreb, 1990.

Optional: Alfirević, N.: Aplication of Business Process Reengineering to Marketing Process Transformation, Tržište, Zagreb, Vol. 9, No. 1-2 (1997).

Name of the course: Environmental Management Systems

Teacher: assoc. prof. PhD. Ivana Bolanča Mirković

Associate teachers:

Lectures (L): assoc. prof. PhD. Ivana Bolanča Mirković

Seminar (S):assoc. prof. PhD. Ivana Bolanča Mirković

Laboratory (LAB):

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+0

ECTS credits: 4

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Yes

Course objectives:The aim of the course is to train students to participate in the implementation of the environmental management system in the company. Students get to know the reasons for environmental protection and the advantages that they achieve by introducing ecologically sustainable production management. The goal is to acquaint students through the contents of the course with how to achieve competitive advantages through environmental protection. A further goal is to train students to carry out environmental management through life cycle assessment "from cradle to cradle", eco-balancing and ecological labeling. One of the goals of the course is to train students to participate in solving the specifics of environmental management for small businesses.

Enrollment requirements: No prerequisites for enrolling in the course.

Prerequisite for taking the course exam: Submission and positive evaluation of a seminar paper.

General And Specific Competence and learning outcomes of the course:
Students will be able to evaluate the advantages achieved by introducing ecologically sustainable production management. Students will be able to participate in planning the modernization of the company based on the principles of sustainability. Students will be able to apply environmental management as a fundamental factor of a successful company. Students will be able to participate in the application of the environmental management system. Students will be able to recognize and evaluate the impact on the environment in the area of emissions of pollutants, process and waste water, consumption of materials and energy for a specific production process. Students will be able to evaluate the eco-balance in order to optimize the ecological suitability of production and products.

Course content (Syllabus) on a weekly basis:

1. Lecture 1: Defining basic concepts in environmental protection. (ECTS 0.3). Seminar: Ecological problems as a consequence of human activity. Division of seminars. (ECTS 0.1)
2. Lecture 2: Reasons for preserving the environment in production. Connection between production and the environment. (ECTS 0.25). Seminar: Benefits achieved by introducing ecologically sustainable production management. (ECTS 0.11)
3. Lecture 3: Principles of sustainable development. Socio-economic foundations of ecological sustainability. (ECTS 0.25). Seminar: Company modernization based on sustainability principles - examples of good practice. (ECTS 0.11)
4. Lecture 4: Monitoring environmental changes and selecting ecological sustainability policy. (ECTS 0.25). Seminar: Indicators of sustainable development. (ECTS 0.11)
5. Lecture 5: Important determinants of ecological management. Seven rules of the 7Rs management system. (ECTS 0.25). Seminar: Ecological management as a fundamental factor of successful companies. (ECTS 0.11)
6. Lecture 6: Relationship between development, environmental protection, and economic growth. (ECTS 0.25). Seminar: Settings of company ecological efficiency. (ECTS 0.11)
7. Lecture 7: Environmental management system: scope, definitions, system requirements. (ECTS 0.25). Seminar: Standard as a fundamental model for assessing environmental management systems. (ECTS 0.11)
8. Lecture 8: Knowledge check through colloquium. Seminar: Environmental management through voluntary agreements. (ECTS 0.11)
9. Lecture 9: Environmental management system model, planning, implementation, and operation. (ECTS 0.25). Seminar: Documentation of environmental management systems. (ECTS 0.11)
10. Lecture 10: Description of the production process - environmental protection and technological process. (ECTS 0.25). Seminar: Verification and corrective measures in environmental management systems. (ECTS 0.11)
11. Lecture 11: Environmental management through the product life cycle, definitions, division, assessment methodology, functional unit, system boundary. Generic elements of life cycle assessment. (ECTS 0.25). Seminar: Practical product life cycle assessment. (ECTS 0.11)
12. Lecture 12: Environmental management through eco-balancing. (ECTS 0.25). Seminar: Eco-balancing and ecological accounting. (ECTS 0.11)

13. Lecture 13: Environmental management through ecological labeling. (ECTS 0.25). Seminar: Examples of ecological labeling in practice within the profession. (ECTS 0.11)
14. Lecture 14: Ecological settings for small entrepreneurship and specificities of environmental management. (ECTS 0.25). Seminar: Good practice examples. (ECTS 0.11)
15. Lecture 15: Knowledge check through colloquium. Compensation for justified absence of student presentations of seminar papers. (ECTS 0.11)

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☒	multimedia and internet ☒	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☒	project ☐	practical work ☐
activities in class ☒	test report ☒	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☒	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☒ Guessing and completion tasks	☒ Multiple choice tasks
☐ Alternative choice tasks	☒ Connecting and arranging tasks
☒ Problem solving tasks	

Other:

Assessment and evaluation of students' work during classes and on the final exam:
The student's activities will be evaluated during each hour of lectures and seminars. The evaluation assessment of the achievement of the learning outcomes is determined by the evaluation of the seminar paper. At the final exam, the student presents the achieved learning outcomes through answers to essay-type questions.

Other:

Teaching process evaluation: Evaluation by students (Survey), constant conversation with students

Student evaluation (survey) ☒
Other:

Refrences

Required: J.Kausek, Environmental Management Quick and Easy, Quality Press, Milwaukee, 2007;J.Kaplan,
Greening your Small Business, Prentice Hall Press, Nev York, 2009, M. Common, S Stagl, Ecological
Economics, Cambrige University Press, Cambrige, 2005.

Optional: Journal of Environmental Economics and Management, Academic Press, Herriges (Ed) A. Xepapadeas (Ed), Environment and Development Economics, University of Crete, Greece

Name of the course: Digital photography printing techniques

Teacher: asst. prof. PhD. Miroslav Mikota

Associate teachers:

Lectures (L): asst. prof. PhD. Miroslav Mikota

Seminar (S):-

Laboratory (LAB):asst. prof. PhD. Miroslav Mikota; Teo Žeželj, mag.ing.graph.tech. Ivana Pavlović, mag.ing.graph.tech.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+1

ECTS credits: 5

Study programme: Graduate Status of the course: Mandatory / Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

Course objectives: After studying the material and performing the exercises, the student will be able to process and optimize the digital record of a photographic image depending on the printing technique, distinguish and use different printing techniques of digital photography, analyze and evaluate the realization of photography using different techniques and through different media.

Enrollment requirements: -

Prerequisite for taking the course exam: Upload of solved tasks

General And Specific Competence and learning outcomes of the course:
After learning, the student will be able to: integrate and demonstrate knowledge in the field of preparing a digital record of a photograph depending on the printing technique, communicate conclusions about the selection of optimal techniques and materials for printing a digital record of a photograph, demonstrate knowledge and understanding in the field of realization of a digital record of a photograph, demonstrate and apply knowledge and understanding in the field of visual and measurement assessment of photographic images.

Course content (Syllabus) on a weekly basis:

1. Introduction, development of techniques for the realization of a digital record of photography
2. Techniques of multiplication of the classical recording of a photographic image

3. Classical photographic procedures as the basis for the realization of a digital recording of a photograph
4. Divisions and selection of techniques for printing a digital recording of a photograph
5. Dominant techniques for printing a digital photo record - techniques and materials based on HiFi DOD ink jet
6. Dominant techniques for printing a digital record of a photograph - techniques and materials based on laser illumination of classic color photographic paper
7. Dominant printing techniques of digital photo recording – techniques based on CMY sublimation printing
8. Alternative printing techniques of the digital record of the photograph - illumination of classic color photographic paper with diodes, autochrome process
9. Other alternative techniques for printing a digital record of a photograph
10. Specifics of printing color and black and white photos
11. Other techniques for realizing a digital record of a photograph
12. Optimization of the digital recording of the photograph depending on the technique of realization
13. Problems of realizing especially demanding digital recordings of photography (HDR, high key, low key...)
14. Technical characteristics of a photographic image
15. Methods of evaluation and assessment of photographic images

Format of instructions:

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☐	field work ☒
exercises on computers ☐	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☒	project ☐	practical work ☒
activities in class ☐	test report ☐	oral exam ☒	portfolio ☒
seminar work ☒	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other:

Assessment and evaluation of students' work during classes and on the final exam:

Colloquium (possibility of exemption from the exam), scientific and professional paper (possibility of exemption from the exam), exam

Assessment and evaluation of students' work during classes and on the final exam:
Continuous monitoring of student work based on the system of assessment and self-assessment of photos, portfolio

Other:

Teaching process evaluation: -

Student evaluation (survey) ☐
Other:

Refrences

Required:

Pierce B: Printmaking Techniques for Fineart Photography and Mixmedia, Pearson Education, 2010. Modrak R, Anthes B: Reframing Photography – Theory and Practice, Routledge, New York, 2011

Optional:
KIphan H: Handbook of Printing Media, Springer, Berlin 2001. Green P: Digital photography, PIRA International 1999.
Langford M, Billissi E: Langford's Advanced Photography, Focal Press, Oxford, 2011.

Name of the course: Art photography 1

Teacher: asst. prof. PhD. Miroslav Mikota

Associate teachers:

Lectures (L): asst. prof. PhD. Miroslav Mikota

Seminar (S):-

Laboratory (LAB):asst. prof. PhD. Miroslav Mikota; Teo Žeželj, mag.ing.graph.tech. Ivana Pavlović, mag.ing.graph.tech.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2

ECTS credits: 6

Study programme: Graduate Status of the course: Mandatory

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

After studying the material and performing the exercises, the student will be able to recognize the specific techniques of certain photographic styles, describe and use different classical and digital photographic systems, set up and use different complex lighting schemes, use special classical and digital special photographic techniques and correction techniques and lomographic photography.

Enrollment requirements: Attended course Applied photography 2 or Basics of applied photography

Prerequisite for taking the course exam: Photo upload, photo evaluation, portfolio.

General And Specific Competence and learning outcomes of the course:
After learning, the student will be able to: apply his knowledge of special photographic techniques in situations requiring a real environment, integrate his knowledge and apply a particular photographic system in situations requiring a real environment, apply and demonstrate his knowledge of setting up and using complex lighting conditions, apply and demonstrate his knowledge from the field of simulation of special photographic techniques, apply and demonstrate their knowledge from the field of photo correction, apply and demonstrate their knowledge from the field of lomography.

Course content (Syllabus) on a weekly basis:

1. Introduction, development of photographic styles 1; Introduction to the practical part

2. Development of photographic styles 2; Personality study I

3. Development of photographic styles 3; Personality study II

4. Development of photographic styles 4; Photographic subjectivism

5. Specifics and application of classic photographic systems 1

Digital manipulation with classic photographic systems

6. Specifics and application of classic photographic systems 2

Digital make-up in use with classic photographic systems I

7. Specificities and application of classic photographic systems 3

Digital make-up in use with classic photographic systems II

8. Studio lighting and lighting setup schemes

Schemes of installation of studio lighting

9. Working with flash; Creative use of flash

10. Natural and combined lighting; Creative use of natural and combined lighting

11. Special photographic techniques; Special photographic techniques through basic photographic motifs

12. Simulation of special photographic techniques

Simulation of special photographic techniques in a digital photography laboratory

13. Classical and digital photo correction

Classic and digital photo retouching

14. Lomography; Lomographic approach to photography

15. Technical and semantic-syntactic approach to complex photographic motifs

Photo evaluation and portfolio creation.

Format of instructions:

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☐	field work ☒
exercises on computers ☐	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☐	project ☐	practical work ☒

activities in class ☐ test report ☐ oral exam ☐ portfolio ☒
seminar work ☐ experimental work ☐ continuous knowledge examination ☒

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks
☐ Alternative choice tasks ☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:

Assessment and evaluation of students' work during classes and on the final exam:

Continuous monitoring of student work based on the system of assessment and self-assessment of photos, portfolio

Other:

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐

Other:

Refrences

Required:
Mikota M: Kreacija fotografijom, V. D. T. Publishing, Zagreb, 2000.
Langford M, Billissi E: Langford's Advanced Photography, Focal Press, Oxford, 2011.

Optional:
Shelley. S-L: A Practical Guide to Stage Lighting, Focal Press, Oxford 1999.
Fizi M:Fotografija – teorija, praksa, kreacija, GZH, Zagreb, 1977.

Name of the course: Design and environment

Teacher: asst. prof. PhD. Ivana Bolanča Mirković

Associate teachers:

Lectures (L): prof. PhD Ivana Bolanča Mirković

Seminar (S):asst. prof. PhD Marina Vukoje

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+0

ECTS credits: 5

Study programme: Graduate Status of the course: Mandatory

Semester: Summer Semester number: II

Possibility of teaching in English: Yes

Course objectives: The main goal of the course is to train students to apply graphic design principles for environmental sustainability. Within the sustainability approach framework, industrial ecology and life cycle assessment settings are used primarily from "cradle to cradle". Students are explained the ecological principles of selecting and saving raw materials and materials, ways to save energy, and the best available printing techniques (BAT), then design for reuse, recycling, and develop a logical conclusion of the right path of choice. Students are introduced to quantitative methods and tools, and the further goal is the development of group work skills and the development of presentation skills.

Enrollment requirements: There are no prerequisites for enrolling in the course

Prerequisite for taking the course exam: Held and positively evaluated seminar work

General And Specific Competence and learning outcomes of the course:
Students will be able to describe and apply design principles for environmental sustainability. Students will be able to explain the settings of industrial ecology. Students will be able to assess the life cycle of a graphic product "from cradle to cradle" and apply it when creating a graphic product. Students will be able to explain the carbon footprint and other ways of determining the impact of products, materials or processes on the quality of the environment and apply them in design. Students will be able to create a graphic product by choosing materials in accordance with environmental sustainability. Students will be able to choose the best available reproduction techniques when creating products. Students will be able to describe and evaluate the results of the application of eco indicators and apply them in solving the task. Students will be able to choose which design eco tools to use in the given examples. Students will be able to evaluate the advantages of reusing and/or recycling products.

Course content (Syllabus) on a weekly basis:

1. Lecture: Introduction, the importance of product creation in the context of environmental quality, generally about the concepts of environmental protection related to design (ECTS 0.25)

   Seminar: Introduction, individual assignments (ECTS 0.11)

2. Lecture: Sustainable development, environmental sustainability and design. (ECTS 0.25)

   Seminar: Design and concept of ecological sustainability, examples of good practice. (ECTS 0.11)

3. Lecture: Design for the environment. Design for X. (ECTS 0.25)

   Seminar: Design and optimization of ecological characteristics of products including phases of production. (ECTS 0.11)

4. Lecture: Design and ecological efficiency. (ECTS 0.25)

   Seminar: Production and service strategy aimed at increased economic profit. (ECTS 0.11)

5. Lecture: Industrial ecology. Historical development. Key settings (ECTS 0.25)

   Seminar: Design for production with sustainable use of resources and energy. (ECTS 0.11)

6. Lecture: Industrial metabolism. (ECTS 0.25)

   Seminar: Flows of materials and energy in industrial production systems viewed from a biological point of view. (ECTS 0.11)

7. Lectures: Industrial symbiosis. (ECTS 0.25)

   Seminars: Examples of good practice: examples of symbiosis in the graphic industry. (ECTS 0.11)

8. Knowledge verification through a colloquium

   Seminar: Design and pollution prevention. (ECTS 0.11)

9. Lecture: Product life cycle assessment. ISO standards. (ECTS 0.25)

   Seminars: Case studies: life cycle assessment for book and e-book. (ECTS 0.11)

10. Lecture: Assessment of the life cycle of a graphic product. Phases of analysis. (ECTS 0.25)

Seminar: Evaluation of the impact of the graphic product according to the impact factors. Design and database. (ECTS 0.11)

11. Lecture: Analysis and comparison of environmental load. Methods: EI, EDIP, CML and others (ECTS 0.25)

    Seminars: Calculation methodology: EI, EDIP. Examples from practice in the domain of materials and printing. (ECTS 0.11)

12. Lecture: Tools of eco-friendly design: Tools that include the product life cycle at all stages. (ECTS 0.25)

    Seminars: Examples of the use of ecological design tools that include the life cycle (ECTS 0.11)

13. Lecture: Environmentally friendly design tools that have a qualitative approach. (ECTS 0.25)

    Seminars: Examples of using ecological tools for design with a qualitative approach. (ECTS 0.11)

14. Lecture: Tools for environmentally friendly design with a quantitative approach. (ECTS 0.25)

    Seminars: Examples of the use of tools for ecologically acceptable design with a quantitative approach. (ECTS 0.11)

15. Knowledge verification through a colloquium.

    Reimbursement of student presentations of seminar papers that were not held justifiably.

Format of instructions:

lectures ☒ laboratory ☐ online ☐
seminars and workshops ☒ multimedia and internet ☐ field work ☐
exercises on computers ☐ independent assignments ☒ work with mentor ☒
other: ☐

Monitoring of students' work:

attending classes ☒ research ☒ project ☐ practical work ☐
activities in class ☒ test report ☐ oral exam ☐ portfolio ☐
seminar work ☒ experimental work ☒ continuous knowledge examination ☒

Type of written examination:

Essay type assignment ☐
Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☒ Multiple choice tasks
☒ Alternative choice tasks
☒ Connecting and arranging tasks
☒ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam: Knowledge verification through a colloquium. Reimbursement of student presentations of seminar papers that were not held justifiably.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Evaluation by students (Survey)

Student evaluation (survey) ☒
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: J.Fiksel, Design for Enviroment, Mc Graw Hill, New York 2012 W.Jadlička, Suistainable Graphic Design, J. Wiley &Sons, 2009 J. Ehrenfeld, Sustainability by Design, Yale University Press,New Haven, 2008

Optional: N. Ashby, Materials and Design, ABS Group Inc., Oxford, 2000.

Name of the course: Graphic Design 4

Teacher: prof. PhD. Maja Brozović

Associate teachers:

Lectures (L): prof. PhD. Maja Brozović

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):prof. PhD. Maja Brozović , asst. prof. PhD Dorotea Kovačević

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 1+0+3

ECTS credits: 5

Study programme: Graduate Status of the course: Mandatory

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

Course objectives: To obtain the knowledge and acquire the know-how in presenting design concept for a visual identity and its application in form of a book of graphic standards. Course focuses on finding and realizing design concepts for visual identity of a company (or a product) through trademark/logotype design, elaboration of all aspects of visual identity and presentation of its intended applications in form of a book of graphic standards. Through lectures and practical work on project assignments, students obtain knowledge and practical skills needed to present design concepts for visual identity, in accordance to the requirements of public competitions. Theme units of the course encompass examples of client's requirements, analysis of the affinity of different job-types/companies, selecting the best solutions, development of design concepts or models, delivering proposals for trademark/logotype design, its presentation and assessment, as well as implementation of the final draft. Student research activities on the project assignment consist in elaborating all aspects of visual identity and materializing it in the form of a book of graphic standards. These include the following: description of the objectives, SWOT analysis in regard to competition, construction of a trademark, appropriate typographic customization and colour pallet definition, listing of authorized and prohibited implementations, creating previews of application on corporate communication, promotional materials and other aspects of its intended use.

Enrollment requirements: Basic level work in graphic computer programs for image and text processing

Prerequisite for taking the course exam: Attended lectures, finished all exercises, submitted the book of graphic standards in digital form to the Merlin system

General and Specific Competence and learning outcomes of the course:
- analysis and critical assessment of marks functioning as visual identity
- evaluate existing, competitive and own author's logo solutions
- designing various concepts for trademark/logotype while respecting the specific needs of the client
- presentation of proposed design concepts for trademark/logotype according to the given framework
- conducting a development project aimed at shaping visual identity
- producing a book of graphic standards according to the client’s requests
- autonomous completion of project assignments in simulated conditions of public competition

Course content (Syllabus) on a weekly basis:

1. Visual identity - definition, purpose, goals, examples
   Analyse graphic solutions of existing signs and company's logos of various activities (0.33 ECTS)

2. A set of guidelines for creating a visual identity (brief)
   Compilation of guidelines for designing the company's visual identity according to the student's choice (0.33 ECTS)

3. Examples of visual identities of related activities, analysis of signs and logos
   Analysis of the visual identities of competing companies in relation to the selected company for which the student drew up guidelines in the previous exercise (0.33 ECTS)

4. Examples of different proposals for sign and logo solutions in relation to a set of guidelines and the selection of the best solution that reflects the stated guidelines
   Design five proposals for a conceptual design of a sign, logo or its combination in relation to the set of guidelines for creating a visual identity (0.33 ECTS)

5. Successfulness evaluation of selected solutions in the real circumstances of the sign (by applying it to different products, materials, media, etc.)
   Selection of the best solution from the five proposed solutions within a group of students (0.33 ECTS)

6. Construction of signs, logos, slogans in the coordinate system, determination of empty space
   Construct the sign, logo and slogan of the chosen solution in the coordinate system, define the empty space (0.33 ECTS)

7. Sign/logo application in different sizes, determination of the minimum allowed size, correction needs in small sizes
   Determine the minimum size of the sign/logo, correct the conceptual solution due to the possible loss of certain parts (0.33 ECTS)

8. Defining the basic and extended color palette, applying systems
   Define the number and types of colors of the sign/logo through different applying systems (0.33 ECTS)

9. Defining official typography: primary and secondary
   Analysis of examples selection of primary and secondary typography, selection justification (0.33 ECTS)

10. Obligatory performance forms of the sign/logo and their application
    Perform the sign/logo in the following forms: monochrome, negative, grayscale, line version (0.33 ECTS)

11. Permitted and forbidden application forms of the sign/logo
    Recommend other permitted forms of sign/logo and define forbidden applications (0.33 ECTS)

12. Sign/logo application on different substrates (monochrome, multicolor, photos)
    Anticipate the need to apply the sign/logo on different substrates and define the appearance of the sign/logo on gray scale, monochrome and multi-colored substrates, photographs (0.33 ECTS)

13. Examples of business documentation, advantages and disadvantages
    Designing business documentation that reflects the recognizability of the subject's visual identity (0.33 ECTS)

14. Examples and purpose of sign/logo application for the purpose of promotional activities
    Sign/logo application on small promotional materials and signage (0.33 ECTS)

15. Examples analysis of different books of standards
    Organization of visual identity items in the form of a book of standards (0.33 ECTS)

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☒	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☒	practical work ☒
activities in class ☒	test report ☐	oral exam ☐	portfolio ☒
seminar work ☐	experimental work ☒	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks

☐ Alternative choice tasks ☐ Connecting and arranging tasks

☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Evaluation of submitted book of graphic standards at the end of the semester in digital form, activities in lectures and exercises.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐

Other: Kliknite ovdje da biste unijeli tekst.

References

Required:

- J. Murphy, M. Rowe: How to Design Trademarks and Logos (Graphic Designers Library), F&W Pubns, 1991.
- B.M. Pederson (Editor): Graphic Corporate Identity, Graphic Press, 1994.
- Manual of graphic standards

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Media Communication

Teacher: asst. prof. PhD. Daria Mustić

Associate teachers:

Lectures (L): Daria Mustić

Seminar (S):Daria Mustić

Laboratory (LAB):Daria Mustić

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+1

ECTS credits: 6

Study programme: Graduate Status of the course: Elective

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

Course objectives:Mastering the conceptual and structural laws of media communication (from semiotics to theory communication and from the theory of public action to media-graphic discourse) - media significance and media codification (logical and aesthetic codes, media perception and graphic communication); media culture and graphic communication in the context of intercultural, social, business, political, religious, cultural, ecological, publicistic, journalistic, information and communication diversity; media communication models in relations with the public (Grunig's PR models, situational and Burkat's models of PR excellence, Bentele's model of public trust, Karl Deutsch's model, clauster models of the public, crisis communication models); media theories (Uses and gratification theory, , Theory of cultivation, Agenda setting, Framing and priming in the media, Critical media paradigm); methods of media research and communication evaluation of media and graphic content; media influence and new media trends, culture and media identities; moral panic, secondary victimization and culture of fear.

Enrollment requirements: none

Prerequisite for taking the course exam: exercises done, seminar paper done

General And Specific Competence and learning outcomes of the course:
Students will develop tools for valorizing the quality of graphic design based on concrete examples; they will master the main disciplinary approaches and paradigms of media communication, know to appoint their representatives, and they will master the critical application of paradigmatic approaches for analysis of media content using specific media to analyze content in different media - comparison of contents and offers.

Course content (Syllabus) on a weekly basis:

1. Introduction to the course: goals and content of the course, student obligations. 0.25
2. History of media communication 0.25
3. Mass society and mass communication 0.25
4. Media effects – celebrity culture 0.25
5. Theory on the use of media to satisfy needs (uses and gratifications), Cultivation theory, Critical media paradigm 0.25
6. Copyright in media industries 0.25
7. Agenda setting 0.25
8. Culture and media identities 0.25
9. Tabloidization, spectacularization and gossip as dominant phenomena of popular culture 0.25
10. Media Americanization ("infotainment" and "militainment") 0.25
11. New media and social changes 0.25
12. Ethics in the media 0.25
13. Media commercialization of childhood 0.25
14. Media violence and culture of fear 0.25
15. Media convergence 0.25

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☒	practical work ☒
activities in class ☐	test report ☐	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☒ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

Evaluation of an independent project assignment in the area of media content analysis, evaluation of team project tasks and presentations of seminar work.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☒

Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: Inglis, F. (2007), Media Theory, An Introduction, Basill Blackwell Ltd, Cambridge; Kunczik,
M./ Zipfel, A. (2006), Uvod u znanost o medijima i komunikologiju, Zaklada Friedrich Ebert, Zagreb
Plenković, M.(2003), Komunikolologija masovnih medija, Kultura komuniciranja, Hrvatsko komunikološko društvo & Nonacom, Zagreb, Plenković, M. / Kučiš, V.(2004), Das Mediensystem Kroatiens. U: Medien: internationales Handbuch, (Internationales Handbuch für Hörfunk und Fernsehen, 2004/2005). Hans-Bredow-Institut für Medienforschung an der Universität Hamburg,Baden-Baden: Nomos, (383-390).
Rusinger, D. (2007), Online Relations, Leitfaden fur moderne PR im
Netz, Schaffer-Poeschel Verlag Stutgart

Optional: Jensen, K.B. (Edited by), (2002), A Handbook of Media and Communication Research,Qualitative and Quantitative Methodologies, Routledge, London and New York,
Frolich, K./ Lovric, D.(2007), Public Relations, Cornelsen, Berlin,
Plenković, M. / Tomažić, T. (2008), Effectiveness and profitability in the context of mass media industries / Efikasnost i profitabilnost u kontekstu industrije
masovnih medija, Informatol.41, 1,1-104 (39-46)

Name of the course: Realization of conceptual solutions 2

Teacher: prof. PhD. Maja Brozović

Associate teachers:

Lectures (L): prof. PhD. Maja Brozović

Seminar (S):

Laboratory (LAB):asst. prof. PhD Josip Bota

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+1

ECTS credits: 5

Study programme: Graduate Status of the course: Mandatory

Semester: Summer Semester number: II

Possibility of teaching in English: Only for foreign students

Course objectives: To obtain the knowledge and skills in a scientific approach to solving the problem of packaging products. The course systematically studies the methodology of designing packaging products from the point of view of functionality, from concept to presentation in graphic media. In addition to functionality, as primary criteria, packaging design includes aesthetic and technological product criteria. The focus of the course is a scientific approach to solving the problem of defining the area, topic and methodology of packaging products. As part of the research methodology, students define hypotheses and criteria to justify them. Conducting research includes appropriate methods, data processing and analysis. In the final phase of the research, students present the entire work they submit in the form of a scientific paper to a professional audience through a discussion of the results. As part of the technological process, students construct, design and produce packaging using a suitable computer CAD program and an automated table cutter.

Enrollment requirements: Basic level work in graphic computer programs for image and text processing.

Prerequisite for taking the course exam: Attended lectures, completed all exercises, make a presentation, submitted scientific work, delivered printed packaging product.

General and Specific Competence and learning outcomes of the course:
- develop a creative and active research approach
- propose criteria for evaluating the functionality of packaging products
- construct and manage the creation of the packaging project assignment in the CAD program
- plan the performance procedures of the packaging product
- present information, concept, problems and their solutions to a professional audience

Course content (Syllabus) on a weekly basis:

1. Problem statement of packaging products - planning thematic units from the field of packaging research, forming teams among students
   Defining the task, types of packaging. Introduction to packaging measurement and quotation tools (0.33 ECTS)
2. Defining the goal of the research, research questions related to the given topic
   Drawing the margin plan for the obtained type of packaging (0.33 ECTS)
3. Findings organization from previous research on a given topic, connecting knowledge with research questions, defining the issue
   Introduction with the operation of the device for cutting the packaging shape, cutting the rest (0.33 ECTS)
4. Factors influencing packaging design: materials and structure, shape, functionality, reproduction process, consumer habits, product price, competition
   Packaging design and visualization (0.33 ECTS)
5. The design plan for the packaging of the product series
   Improvement of box cut, design corrections (0.33 ECTS)
6. Research methodology - selection of adequate methods, research design
   Preparation of materials for creating a packaging project assignment (0.33 ECTS)
7. Determination of variables and measurement scales
   Packaging Valorisation (0.33 ECTS)
8. Planning and conducting research based on defined variables and scales (0.33 ECTS)
9. Obtained research results presentation - ways of presenting results using illustrative systems (0.33 ECTS)
10. Statistical processing of results, application of appropriate tests (0.33 ECTS)
11. Discussion based on obtained research results, review on the confirmation or rejection hypotheses (0.33 ECTS)
12. Conclusion based on the conducted research, summary of the entire work (0.33 ECTS)
13. Oral presentation of packaging design to all course participants (0.33 ECTS)
14. Oral presentation of packaging design to all course participants (0.33 ECTS)
15. Oral presentation of packaging design to all course participants (0.33 ECTS)

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☒	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☐
activities in class ☒	test report ☒	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

The final grade includes individual scores from:
- oral presentations of project packaging design to all course participants
- final packaging product designed and realized within the framework of the exercises
- colloquium
- scientific article written in a team of three authors
- activities at lectures and exercises

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐

Other: Kliknite ovdje da biste unijeli tekst.

References

Required:
- G. Kozak, J. Wiedemann: Package Design Now! Taschen, Koln, 2008.
- B. Edwards, M. Klimchuk, R. Wallace, S. Werner: Really Good Packaging explained, Rockport Publishers, Beverly, MA, 2009.
- A. Tkalac Verčić, D. Sinčić Ćorić, N. Pološki Vokić: Priručnik za metodologiju istraživačkog rada, M.E.P.d.o.o., Zagreb, 2010.

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Packaging and technology 2

Teacher: asst. prof. PhD. Branka Lajić; asst. prof. PhD. Davor Donevski

Associate teachers:

Lectures (L): asst. prof. PhD Branka Lajić

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):asst. prof. PhD Davor Donevski

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+2

ECTS credits: 5

Study programme: Graduate Status of the course: Elective

Semester: Winter Semester number: III

Possibility of teaching in English: Yes

Course objectives:The main course objective is making students able to design protective packaging. Main objective is achieved through sub-objectives which encompass acquiring theoretical knowledge about norms and methods of product and protective package testing, properties of protective materials and use of models for prediction of product-packaging system response to shock and vibration inputs.

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: Completion of protective packaging design project

General And Specific Competence and learning outcomes of the course:
Upon completion of the course students will be able to apply models for prediction of products' and product-packaging systems' responses to shock and vibration inputs and select appropriate protective materials.

Course content (Syllabus) on a weekly basis:

1. Exposure of product-packaging system to vibrations: free vibrations (0,16)
   Problem sets – modelling free vibrations (0,16)
2. Exposure of product-packaging system to vibrations: forced vibrations (0,16)
   Problem sets – modelling forced vibrations (0,16)
3. Protective material properties: determining elasticity constant k and damping constant of packaging materials from empirical data. (0,16)
   determining elasticity constant k and damping constant of packaging materials from acceleration data (0,16)
4. Using Laplace transform with models with harmonic inputs (0,16)
   Problem sets – models with harmonic inpus (0,16)

5. Triangle, square, trapezoid and Dirac delta inputs. Using Laplace transform with models with such inputs. (0,16)
   Models with triangle, square, trapezoid and Dirac delta inputs (0,16)
6. Using convolution to determine response of damped system to input (0,16)
   Problem sets – determine system response to input (0,16)
7. Complex vibrations and their decomposition using Fourier series (0,16)
   Problem sets – decomposition of complex vibrations to harmonics (0,16)
8. Using discrete Fourier transform (DFT) with transport field time-acceleration data (0,16)
   Problem sets – determining dominant vibration frequencies from transport field data using DFT/FFT (0,16)
9. Methods of vibration testing of products and product-packaging systems. (0,16)
   Test planning – choice of methods (0,16)
10. Power spectral density (PSD) and International safe transit association (ISTA) profiles (0,16)
    Calculating and applying PSD profiles (0,16)
11. Product and product-packaging shock fragility testing (0,16)
    Problem sets – applying cushion curves (0,16)
12. Shock response spectrum (SRS) and its application to selection of protective material (0,16)
    Problem sets – application of SRS analysis (0,16)
13. Protective packaging design and development process (0,16)
    Case study (0,16)
14. Acquisition of transport field data. Application of generic data. (0,16)
    Processing and use of transport field data (0,16)
15. Reflection on previous topics, integration and preparation for final project (0,16)
    Project example (0,16)

Format of instructions:

lectures ☒	laboratory ☒	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☒	practical work ☐
activities in class ☐	test report ☐	oral exam ☐	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☐ Multiple choice tasks
☐ Alternative choice tasks
☐ Connecting and arranging tasks
☒ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Evaluation of final project.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Tracking how successfully students solve problems in smaller groups.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: 1. Goodwin, D., Young, D., Protective packaging for distribution, DEStech Publications, Lancaster, 2011; 2. Brandenburg, R. K., Lee, J., Fundamentals of packaging dynamics, L.A.B. Equipment, 2001; 3. Soroka, W., Fundamentals od packaging technology, The Institute of Packaging, 1999

Optional: Kreyszig, E., Advanced Engineering Mathematics, John Wiley & Sons, 2011

Name of the course: Graphics of documents and securities

Teacher: Assoc. Prof. Ivana Žiljak Stanimirović, Ph.D.

Associate teachers:

Laboratory (LAB): Željko Bosančić, mag.ing.graph.tech

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L + LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+2
Lectures (30 hours), Laboratory exercises (30 hours)

ECTS credits: 5.0

Study programme: Graduate Study

Status of the course: Elective

Semester: Winter Semester number: III

Possibility of teaching in English: for foreign students

Course objectives:
Design of graphics for individualized documents and securities with planned protection against forgery. Creation of original screened proprietary PostScript graphics and 3D graphics design for lenticular technologies. The subject deals with security graphic elements on documents and securities. An analysis of the project task of creating graphics for documents and securities is being carried out. Design of all elements on documents and securities, examples on wallets, tickets, passports, postage stamps. The typography of the denomination, microtext, and the planning of hidden information are analyzed and designed in visual, ultraviolet and near-infrared spectrum. Marks for the blind and visual impairment, watermark and portrait. Subordination of typography to the requirements of security printing: for letterpress, intaglio and screen printing. Line and pixel graphics as information and as anti-copying technology. Planning of engraving and transition graphics in mutually different securities performance technologies. Planning of graphics on documents depending on the sequence of implementation technologies: design of metal and UV threads in paper, analysis of UV and infrared inks, design of protective graphics for intaglio printing, folio printing, screen printing, iris and ink application plan. Optically variable colors. Designing security elements for kinegram. Designing typography and portraits in lenticular technology for application on cards. Installation individualized raster element through PostScript in the portrait. Designing security line graphics and individual rosettes. Designing dinamic rosettes in lenticular 3D graphics. Security graphics on transparent polypropylene. Linearization of drawings from vector to pixel shape. Innovations in security graphics. Counterfeiting and anti-counterfeiting planning. Designing individualized documents and securities.

Enrollment requirements: basics of working with a computer in a Web 2.0 environment.

Prerequisite for taking the course exam: class activity, online activity, exercise assignments, presentation

General and Specific Competence and learning outcomes of the course:

- knowledge about security graphic elements on documents and securities,
- planning graphics on documents depending on the sequence of protective technologies implemented,
- design of nominal typography, microtext, typography in line graphics and planning of hidden text and information,
- designing individualized security pixel PostScript graphics,
- design and implementation of security line graphics and individualized rosettes,
- graphic planning for the UV and IR spectrum,
- planning of security 3D graphics for lenticular technologies on documents and cards,
- planning graphics for kinegrams,
- knowledge of counterfeit protection systems,
- design of individualized documents and securities.

Course content (Syllabus) on a weekly basis:

1. L: Introduction to the overview of all security graphic elements on documents and securities. Analysis of the project task of creating graphics for documents and securities.
   LAB: Setting the basic design concept of individualized document and security, the elements of which will be implemented in other exercises.
   0.3 ECTS

2. L: Lecture on security graphic elements on banknotes, basic elements, portrait, comparison of security elements, trends in protection and graphic design of securities. Marks for the blind and partially sighted, watermark and portrait.
   LAB: Planning of the first security elements and arrangement of elements. Portrait. Watermark planning, information design for the blind and visually impaired.
   0.3 ECTS

3. L: Lecture on security graphic elements on personal documents and passports, protection standards and trends in the country and worldwide.
   LAB: Designing security graphic elements for use on personal documents.
   0.3 ECTS

4. L: Lecture on security graphic elements on securities, documents, diplomas, checks, vouchers and tickets. Possibilities of protection, individualization in smaller and larger editions.
   LAB: Designing security graphic elements on documents, checks and tickets with individualized information.
   0.3 ECTS

5. L: Lecture on security graphic elements on postage stamps, historical development of stamps, the possibilities of security graphics, double infrared elements, new technologies in the execution of postage stamps, planning the preparation of security elements on the sheet.
   LAB: Designing security graphic elements on a personal postage stamp.
   0.3 ECTS

6. L: Lecture on design elements of security nominal typography, microtext. Typography planning in line graphics. Planning hidden typography for the visual, ultraviolet and near infrared spectrum. Subordination of typography to the requirements of security printing: for letterpress, intaglio, intaglio and screen printing.
   LAB: Nominal typography and microtext on securities, individualzied design.
   0.3 ECTS

7. L: Line and pixel graphics as information and anti-copying technology. Designing an individualized raster element. Planning of engraving and the transition of graphics in mutually different securities performance technologies.
   LAB: Designing security line and pixel graphics.
   0.3 ECTS

8. L: Linearization of drawing from vector to pixel state. Designing and installation individualized raster element through PostScript in the portrait.
   LAB: Creating original rasterized proprietary PostScript graphics. Design and installation of an individualized raster element through PostScript in the portrait.
   0.3 ECTS

9. L: Planning graphics on documents depending on the order of implementation technologies: design of metal and UV threads in paper, analysis of UV and infrared inks, design of security graphics for intaglio printing, folio printing, screen printing, iris and dye application plan. Optically variable colors.
   LAB: Designing and planning the design of metal and UV threads in paper, prepress.
   0.3 ECTS

10. L: Designing security line graphics and individualized rosettes in Postscript programming language. Designing dinamic rosettes in Postscript for performance in lenticular 3D graphics. Designing typography and portraits in lenticular for application on cards. Designing security elements for kinegram.
    LAB: Independent design of security line graphics and individualized rosettes in lenticular 3D graphics. Projecting the change of typography and portrait in the lenticular. Designing 3D graphics for lenticular technologies.
    0.4 ECTS

11. L: Security graphics on transparent polypropylene. Analysis of securities worldwide derived from polypropylene and trends in the use of polypropylene in security graphics in the future.
    LAB: Planning of security graphics on transparent materials.
    0.3 ECTS

12. L: Innovations in security graphics. New achievements. Dual graphics planning capabilities in ultraviolet (UV), visible (V) and near infrared spectrum (NIR).
LAB: Planning and drafting graphics for the UV spectrum, planning and drafting graphics for the IR spectrum.
0.4 ECTS

13. L: A lecture on counterfeiting, and counterfeiting protection planning.
LAB: Scanning and recording of securities with a forensic camera, analysis of security graphic elements from recorded securities.
0.4 ECTS

14. L: Lecture on designing a complete individualized document and security method preparation of the document with all security elements for implementation.
LAB: Merging all individualized elements during the exercises into a unique and protected graphic product (e.g. banknote, passport, ticket, value card). Designing individualized documents and securities.
0.4 ECTS

15. L: Lecture on the possibilities of conventional and multimedia document presentation and securities.
LAB: Creation of a percentage of individualized documents and securities with legends and descriptions of protection in the UV, V and NIR spectral ranges.
0.4 ECTS

Format of instructions:

lectures ☒	laboratory ☒	online ☐
seminars and workshops ☐	multimedia and internet ☒	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☒
activities in class ☒	test report ☒	oral exam ☒	portfolio ☐
seminar work ☐	experimental work ☒	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☒ Connecting and arranging task
☐ Alternative choice tasks	☒ Problem solving tasks
☐ Multiple choice tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Evaluation of student activities; work on exercises, project tasks, research, presentations. Midterm, written, oral exam.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Official survey

Student evaluation (survey) ☒
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required:
- Vilko Žiljak: „KUNA, PAPIRNATI NOVAC REPUBLIKE HRVATSKE“, Hrvatska narodna banka i FS, Zagreb ,1994. ISBN 953-6052-14-8,
- Vilko Žiljak, Klaudio Pap: „POSTSCRIPT programiranje grafike“, FS, Zagreb, 1998. ISBN: 953 - 199 –000,
- I. Žiljak, K. Pap, J. Žiljak Vujić, “Infrared Design”, FS, Zagreb, (2008), ISBN 978-953-7064-09-9, međunarodna recenzija: Darko Agić, Vesna Kropar Vančina, Frank Romano, Andrew Tribute, KurtWolf, Anastasios E. Politis,
- Klaudio Pap, Jana Žiljak Vujić, Ivana Žiljak: „DESIGN OF DIGITAL SCREENING“, // FS, Zagreb, 2008.ISBN 978-953-7064-10—5, NSK: 667861, p120 međunarodna recenzija:, Darko Agić, Hr, Andrew Tribute, Eng. I. Žiljak, K. Pap, J. Žiljak Vujić, “Infrared Security Graphics”, FotoSoft, Zagreb, (2009), ISBN 978-953-7064-11-2,
- David Standish: „The Art of Money: The History and Design of Paper Currency from Around theWorld“.

Optional:
- European Central Bank: "How the euro became our money. A short history of the euro banknotesand coins", Eurosystem, 2007, ISBN: 92-9181-985-9 http://www.ecb.europa.eu/pub/html/index.en.html
- „The Latest in U.S. Currency Design“, www.newmoney.gov

Methods of quality monitoring that ensure the acquisition of output knowledge, skills and competences:
Quality monitoring includes the analysis and evaluation of student achievements, project tasks on exercises and research activities with the aim of achieving the expected learning outcomes.

Name of the course: Measuring in the printing process

Teacher: assoc. prof. PhD. Igor Majnarić

Associate teachers:

Lectures (L): assoc. prof. PhD. Igor Majnarić

Seminar (S):assoc. prof. PhD. Igor Majnarić

Laboratory (LAB):-

Type of instructions (L- lectures; S- seminars; LAB -laboratory): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 1+1+0

ECTS credits: 4

Study programme: Graduate Status of the course: Mandatory

Semester: Winter Semester number: III

Possibility of teaching in English: No

Course objectives: Students deepen the theoretical foundations based on machine components that are a possible addition to modern printing machines. All relevant peripheral components (measuring devices) including their function, construction, and possible regulation will be analyzed in more detail. In the course, students are introduced to the in-line and out-line measurement methods necessary for the operation of the printing system. When describing the operation of individual components, not only standard SI units of measurement, larger and local (Imperial) are applied. At the same time, the goal is to teach students how to adapt them to our thickness, so that unwanted mistakes do not occur. standard measurements in IS measures. In particular, it will focus on SI units from the field of graphic technology, without which it is impossible to successfully monitor the production flow. One of the goals of the course is to impart knowledge about environmental parameters (temperature, R&D, air flow,...) and how they affect the printing production process. In doing so, he will focus on the parameters that ensure the successful installation of printing machines, while achieving optimal climatic conditions in the printing press, without which there is no uniform production. At the end of the course, during the preparation of the seminar, students will process in detail systems for quick drying, where they will focus on the application of new electromagnetic sources (IR, NIR, UV, LE UV, LED UV, EB) and inks that will dry the print in a short time and enable the generation of new graphic products.

Prerequisite for taking the course exam: -

General And Specific Competence and learning outcomes of the course:
The application of graphic engineering knowledge in the field of functional applications, and the ability to apply offset printing as a relevant technique for mass reproduction. Synthesis of knowledge for the implementation of regulation and control of print quality with a detailed

analysis of working procedures in the basic production process (all relevant factors of conventional printing techniques), and assessment and determination of the adequacy of the application of individual machine components to the production process. proposing new and functional solutions for graphic products with critical judgment during selection Consumables (specificities of printing substrates and quick-drying inks) in order to achieve a better print. Development of functional packaging models and rational judgment of quantitative and qualitative profitability of offset technique intended for packaging printing. Students will be able to assess which peripheral components are necessary on a printing machine with regard to productivity and print quality. after completing the course, students will be able to explain in detail all construction variants of pre-refer units together with regulatory measuring devices (tempering of rollers, central preparation of damping solution, unit for powdering, unit for cleaning and recycling waste solvents,...). This alone will enable a quantitative and qualitative assessment of the completed production process. For the most important measured variables, students will be able to perform independent conversions from SI units to Imperial units and vice versa. For the needs of the seminar, students will be able to critically select adequate measuring methods and, in accordance with them, realize an adequate state of the machine. Based on the theory obtained during the lectures and seminars (by reviewing the standards and technical documentation), the student will be able to independently evaluate the optimal machine configuration and assess which of them is optimal for achieving the desired graphic products.

Course content (Syllabus) on a weekly basis:

1. Introductory lecture (def. rights and duties of students, def. seminar from the course Metrology in the press and peripheral press units, def. literature)

   Defining the meter and second as base SI units and their subvariants in the Imperial system. The importance and expediency of measuring lengths and times during the printing process. Equipment for measuring and regulating length and time together with their mechanical constructions. (0.30 ECTS)

2. Defining kilograms and pascals as base SI units and their subvariants in the Imperial system. The importance and expediency of measuring mass and pressure during the printing process. Equipment for regulation and measurement of mass and pressure together with their design.

   Mechanical construction of printing compressor units and their application in a printing press. Defining Joule and Watt as base SI units and their subvariants in the Imperial system. The importance and expediency of regulation and measurement of energy and power during the printing process. (0.30 ECTS)

3. Defining temperature as the base SI unit and its subvariants in the Imperial system.

   The importance and expediency of temperature regulation and measurement during the printing process. Equipment for measuring temperature together with their

performance in the drying process. Description of the module for thermal drying of prints. Construction of heat emitters and determination of their characteristics.

Defining the temperature control system inside the printing machine. The principle of water and air cooling of the printing press. The principle of tempering of the coloring device, the sheet transport device and the moistening device. Measurement of electrical conductivity and pH values of liquids and water hardness. (0.30 ECTS)

4. Systems for regulating humidity in the room. Devices for measuring HV air and moisture in paper. Measuring the hardness of basic machine components. Measurement according to Wilkers, Rockwell, Brinell and Shor. The principle of UV drying in offset printing machines. The drying mechanism of UV offset inks. Structures of UV drying modules. Electromagnetic characteristics of emitters (mercury lamps). Measurement of electromagnetic radiation in the UV and visible part of the spectrum. (0.30 ECTS)

5. Application of LE UV drying. Principle of LEUV drying in offset printing machines. Drying mechanism of LE UV offset inks. Electromagnetic characteristics of doped mercury lamps and its construction. The principle of LED UV drying in offset printing machines. The drying mechanism of LED UV offset inks. Electromagnetic characteristics of LE UV and LED UV light sources. The principle of EB drying in printing machines. EB drying module constructions. Electromagnetic characteristics of EB sources. Measurement of electromagnetic radiation in the low frequency area. Dyes that dry with EB radiation. (0.30 ECTS)

6. Measuring devices for regulation and monitoring of print quality. Principle of operation of densitometric and spectrophotometric measuring devices. The principle of image analysis of the prints obtained. Calculation and application of relevant color factors. Standard color values for offset printing. Remote control of color settings. Systems for automatic monitoring of print quality.

   Refinement of prints. The basic function of the varnishing process. Unit for in-line varnishing in offset printing. Types of varnishes and possible ways of applying varnishes. Performances of in-line painting with the addition of special metallic inks. The principle of in-line cold application of metal foils. Measurement of realized gloss. Measurement of metallic tones. (0.25 ECTS)

7. Peripheral units as a factor for machine performance. System for automatic cleaning of the machine and purification of waste liquids. Anikolor printing unit.

   Additional devices inside multi-color printing machines to increase productivity. Their construction and purpose (auto plate, perforating, automatic sheet turning, cleaning machine, autopile, cut star, powder application device). Types of powders for the graphic industry. Presentation of the resulting savings during their work.

   (0.25 ECTS)

8. Public presentation of written seminars and their evaluation.

9. Public presentation of written seminars and their evaluation.
10. Public presentation of written seminars and their evaluation.
11. Public presentation of written seminars and their evaluation.
12. Public presentation of written seminars and their evaluation.
13. Public presentation of written seminars and their evaluation.
14. Public presentation of written seminars and their evaluation.
15. Public presentation of written seminars and their evaluation.

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☒	test report ☐	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☒

Objective-type tasks (multiple items can be selected):

☒ Guessing and completion tasks	☒ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other:-

Assessment and evaluation of students' work during classes and on the final exam:

-

Other: -

Teaching process evaluation: Monitoring one's work (teaching process evaluation):

Student evaluation (survey) ☒

Other:

Refrences

Required H. Kipphan et al., Handbook of Print Media, Springer, Berlin, 2001.

UV technology, A Practical Guide for all Printing Processes, Working committee for UV Printing, 2006. T.M. Destree, The Lithographers Manual, GATF, Pittsburgh (PA) 1994.

SI Systeme International; International System of Units

M. Brzinšćak, Mjerenje i računanje u tehnici i znanosti, Tehnička knjiga Zagreb,1970.

I. Manarić, Studija indirektne elektrofotografije, Grafički fakultet Zagreb, 2007.

Optional: -

Name of the course: Optimization of printing systems

Teacher: prof. PhD. Nikola Mrvac

assoc. prof. PhD. Mile Matijević

Associate teachers:

Lectures (L): prof. Ph.D. Nikola Mrvac; Assoc. Ph.D. Mile Matijević

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):prof. Ph.D. Nikola Mrvac; Assoc. Ph.D. Mile Matijević; M.Sc. sc. Ivan Pučić

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2

ECTS credits: 6

Study programme: Graduate Status of the course: Elective

Semester: Winter Semester number: III

Possibility of teaching in English: No

Course objectives: The aim of the course is to enable students to acquire professional competences related to the changes that are taking place in printing in the modern multimedia environment, and in view of the increasing transition of traditional printing products to digital forms.

Enrollment requirements: Basics of working on a computer in web 2.0 environment.

Prerequisite for taking the course exam: Class activity, online activity, project assignments, portfolio, presentation of completed activities

General And Specific Competence and learning outcomes of the course:
Students will be able to: 1) create a production plan for a certain graphic product and adapt it to a modern multimedia environment 2) prepare and organize everything necessary to enable the printing of a graphic product, i.e. prepare it for its digital edition 3) qualitatively evaluate different solutions within certain specific systems, taking into account the availability and capabilities of certain media 4) standardize certain jobs when creating certain graphic products for printed and digital editions 5) present and explain the advantages and disadvantages of certain solutions, taking into account the available technology and the specifics of certain systems in modern multimedia environment.

Course content (Syllabus) on a weekly basis:

1. Analysis of possibilities and relations between printed and electronic media. (0.4 ECTS)
2. Limitations and advantages of print and electronic media. (0.4 ECTS)
3. Formats of printed and electronic editions. (0.4 ECTS)
4. Standards of printed and electronic editions. (0.4 ECTS)
5. Devices for reading digital editions. Defining styles, links, hyperlinks, headers, footers. (0.4 ECTS)
6. Basic differences between printed and electronic editions (fixed layout / fluid break). (0.4 ECTS)
7. Creation of content for printed and electronic editions. (0.4 ECTS)
8. Legality of data processing for printed and electronic editions. (0.4 ECC)
9. Characteristics of individual formats. (0.4 ECC)
10. Technological needs of individual formats. (0.4 ECTS)
11. Requirements and analysis of each individual medium. (0.4 ECC)
12. Stages of creating a certain edition. (0.4 ECTS)
13. Realization of e-editions in different media. Emergence of interactivity in printed form. (0.4 ECTS)
14. The emergence of interactivity in digital form. (0.4 ECC)
15. The future of print and electronic media. (0.4 ECTS)

Format of instructions:

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☒	field work ☐
exercises on computers ☒	independent assignments ☒	work with mentor ☒
other: ☒		
e-learning, web 2.0 technologies		

Monitoring of students' work:

attending classes ☒	research ☒	project ☒	practical work ☒
activities in class ☒	test report ☒	oral exam ☐	portfolio ☒
seminar work ☒	experimental work ☒	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐
Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☐ Multiple choice tasks
☐ Alternative choice tasks
☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Evaluation of all student activities; seminar work, project tasks, research, presentations and all other activities that are related to the obligations related to the course and the realization of the expected learning outcomes.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Evaluation of all activities that are recorded, analyzed and improved after each semester, according to the interests and specific needs of each generation. Quality monitoring includes analysis and evaluation of student achievements, seminar papers, project tasks, research activities, presentations and all other activities that are related to the obligations of the course and the achievement of the expected learning outcomes.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

References

Required: Nikola Mrvac, Predavanja i vježbe iz kolegija Optimalizacija tiskarskih sustava, www.eva-sms.net,
Thompson J.B., Books in the digital age, Polity Press, 2013.

Optional: Additional readings, www.eva-sms.net

Name of the course: The History of printing

Teacher: prof. PhD. Branka Lozo

Associate teachers:

Lectures (L): Kliknite ili dodirnite ovdje da biste unijeli tekst.

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2 + 1

ECTS credits: 4

Study programme: Graduate Status of the course: Mandatory / Elective

Semester: Winter Semester number: III

Possibility of teaching in English: Yes

Course objectives:After completing the course the students should be aware of the relevance of the national heritage in the context of the global history of printing and related inventions; the course should also reveal the diversity of the present-day options in the printing-related activities.

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: Kliknite ili dodirnite ovdje da biste unijeli tekst.

General And Specific Competence and learning outcomes of the course:
The history of paper production, spreading from China to Europe during centuries, distinction from velum and papyrus; etymology of the ancient expressions *liber* and *byblos*; First printed book in China in the 7th century, wooden and *china* types, printing in Korea; The theory of possible spread of the knowledge from the Far East to Europe via the Silk way; Johannes Gutenberg, his life and social circumstances; Gutenberg's inventions prior to the printing; inventions related to printing: wooden movable types, metal movable types, new ink formulation, preparation of the press; The Bible, technical aspects: printing substrates: paper and velum; typesetting: 40 and 42 lines; black ink printing, rubrication: printed and written; illustrations and illuminations; binding. Preserved copies and fragments, digitalized velum and paper copies, British Library. The spread of the printing technique: European countries; Croatia; Non-European countries. The relevance of Italian printing houses for the Croatian printing history: Venice, Padua, Rome; Croatian printers in Italy; Croatian authors of the books printed in Italy. Croatian incunabula: types in Glagolitic alphabet, The Missal, the first Croatian printed book, the very first book printed in Glagolitic types, other Croatian incunabula, Glagolitic and Latin; preserved copies; reprints. Croatian printing-houses: Kosinj,

Senj, Rijeka; Croatian printers in Croatia: Blaž Baromić, Silvestar Bedričić, Gašpar Turčić, Šimun Kožičić Benja. The role of Blaž Baromić: Printing house in Senj; invention of ligatures in typesetting of Glagolitic texts. Printing houses in continental Croatia. Newspaper: development of newspaper, periodical editions: written in Greece and Rome; printed in Germany, England, France, Italy, Netherlands and Switzerland. Newspaper in Croatia: Pavao Ritter Vitezović, Ljudevit Gaj. Invention of offset printing, web offset; other printing techniques

Course content (Syllabus) on a weekly basis:

1. The history of paper production
2. First printed books
3. Johannes Gutenberg – his life
4. Gutenberg's inventions
5. The Bible
6. Spreading of the printing skill all around the World
7. Croatian incunabula
8. Development of the Newspaper
9. Development of other printing techniques
10. Study visit to National and University Library: Manuscripts and Old Books Collection
11. National and University Library: Print Collection, Recovery department
12. Croatian State Archives
13. The History of Rijeka papermill
14. Aloys Senefelder, his life and inventions
15. E-books

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☐	research ☐	project ☐	practical work ☐
activities in class ☐	test report ☐	oral exam ☐	portfolio ☐
seminar work ☐	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☒

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks

☐ Alternative choice tasks ☐ Connecting and arranging tasks

☐ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

The written paper examination is due after every three or four teaching units

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: The students will be asked to assess the quality of the course in the form of an anonymous survey at the end of the semester.

Student evaluation (survey) ☐

Other: The students will be asked to assess the quality of the course in the form of an anonymous survey at the end of the semester.

Refrences

Required: Mesaroš, F., Grafička enciklopedija, VGŠ, 1981. Stipčević,A.: Povijest knjige, Nakladni zavod Matice hrvatske, Zagreb, 1985 Nazor, A., Knjiga o hrvatskoj glagoljici, HAZU, 2008.

Optional: Budiša,D.: Počeci tiskarstva u Europskih naroda, Kršćanska sadašnjost i Nacionalna i sveučilišna biblioteka, Zagreb, 1984. Ilona Hubay; Incunabula Short Title Catalogue, British Library, 1985.

Name of the course: Art photography 2

Teacher: asst. prof. PhD. Miroslav Mikota

Associate teachers:

Lectures (L): asst. prof. PhD. Miroslav Mikota

Seminar (S):-

Laboratory (LAB):asst. prof. PhD. Miroslav Mikota; Teo Žeželj, mag.ing.graph.tech. Ivana Pavlović, mag.ing.graph.tech.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2

ECTS credits: 6

Study programme: Graduate Status of the course: Mandatory / Elective

Semester: Winter Semester number: III

Possibility of teaching in English: Only for foreign students

Course objectives: After studying the material and performing the exercises, the student will be able to simulate old photographic techniques and apply their simulations, define and apply technical solutions for individual syntactic requirements, and apply advanced photographic techniques.

Enrollment requirements: Attended course Applied photography 2 or Basics of applied photography

Prerequisite for taking the course exam: Photo upload, photo evaluation, portfolio.

General And Specific Competence and learning outcomes of the course:
After learning, the student will be able to: apply and demonstrate his knowledge and understanding in the field of noble printing techniques and historical photographic techniques and their simulations, apply and demonstrate his knowledge in technically and syntactically complex photographic motifs, apply and demonstrate his knowledge in specific photographic techniques (IR ,stereophotography, photography and animation, chronography), apply and demonstrate creative photographic solutions in the field of multimedia and mixed media environments, have lifelong education skills in the field of photography.

Course content (Syllabus) on a weekly basis:

1. Introduction, development of photography in Croatia; Introduction to the practical part

2. Development of photographic styles and techniques in Croatia 1

Black-and-white and color photos with predominantly light tones

3. Development of photographic styles and techniques in Croatia 2;

Black and white photos with mostly dark tones

4. The development of photography styles and techniques in Croatia 3; The color of the photo is mostly dark tones

5. Modern daguerreotype; Self portrait

6. Old photographic techniques and their simulation

Application of old photographic techniques on classic photographic motifs

7. Modulation of effects on complex photographic motifs

Transfer of different effects and their modulation on complex photographic motifs

8. Photography on the border between negative and positive and color and black and white photos

Black and white on a color photo and color on a black and white photo

9. Dynamic range, HDR, pseudo HDR and fake HDR photography

HDR as an interpretation of the Zagreb School of Photography

10. Chronography, photography and moving image; Zooming and panning

11. IR photography, simulation of IR photography; Landscapes I

12. Stereophotography; Landscapes II

13. New trends in photography; Study of the human body I and II

14. Selection and presentation of photos, realization of photos

Photo evaluation, portfolio creation

15. Mixmedia and multimedia character of photography, photography as an independent medium

Preparation and production of photographs for exhibitions **Format of instructions:**

lectures ☒	laboratory ☒	online ☒
seminars and workshops ☐	multimedia and internet ☐	field work ☒
exercises on computers ☐	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☐ research ☐ project ☐ practical work ☒
activities in class ☐ test report ☐ oral exam ☐ portfolio ☒
seminar work ☐ experimental work ☐ continuous knowledge examination ☒

Type of written examination:
Essay type assignment ☐
Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks
☐ Alternative choice tasks ☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:

Assessment and evaluation of students' work during classes and on the final exam:
Continuous monitoring of student work based on the system of assessment and self-assessment of photos, portfolio

Other:

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐
Other:

Refrences

Required:
Mikota M: Kreacija fotografijom, V. D. T. Publishing, Zagreb, 2000. Langford M, Billissi E: Langford's Advanced Photography, Focal Press, Oxford, 2011.

Optional:
Gursky Z: Svjetloslikarstvo – knjiga o fotografiranju, Matica hrvatska, Karlovac, 1998.
Heidtmann F: Kunstphotographische Edeldruckverfahren heute, Berlin Verlag, 1990.

Name of the course: Introduction into the theory of experimental work

Teacher: assoc. prof. PhD. Damir Modrić

Associate teachers:

Lectures (L): Damir Modrić

Seminar (S):Damir Modrić

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+1+0

ECTS credits: 5

Study programme: Graduate Status of the course: Elective

Semester: Winter Semester number: III

Possibility of teaching in English: Yes

Course objectives:The aim of the course is to acquire basic and professional knowledge, skills and abilities to implement experimental design techniques to improve the production process in graphic technology.

Enrollment requirements: /

Prerequisite for taking the course exam: /

General And Specific Competence and learning outcomes of the course:
Becoming familiar with experimental design. Preparatory actions (collecting literature, selecting collaborators, etc.). Observation and experimentation. Resolution and propagation of errors. Testing hypotheses. Hypotheses, models, theories, and laws. Defining and analysing measured quantities. The possibility of designing and analysing comparative experiments. Experimental noise (error) and its sources. Types, propagation and elimination of noise. Data acquisition. The existence and treatment of possible alternative hypotheses. Uncertainty (measurement inaccuracy) and experimental design. Building models. Assessing and deciding which factors to use in modelling. Monitoring experiments. Reviewing sampling methods. Deciding when computer simulation can replace experimentation. Statistical processing. Interpretation of measured data. Characteristics of instruments and sensors. Instrument and sensor noise. Standards and common measurements of some quantities. Calibration of instruments and sensors. Determining instrumental function. The course applies fundamental and general knowledge in the analysis of technical and technological processes, classification and explanation of actions and processes within technological units, and applies knowledge from mathematics, chemistry, physics, and modern computer tools to scientific and engineering problems. Also, it enables students to use appropriate mathematical techniques

and concepts to obtain quantitative solutions to problems in the graphic industry. This course aims to enable students to understand the logic behind experimental design, understand the factors that promote better experimental design, understand the logic behind inferential statistical testing, present statistical analysis results accurately, concisely and coherently. To apply their understanding of experimental design and statistics, and critically evaluate published research. Furthermore, students will learn to design experiments in the field of graphic technology (both technology and design) and report the results in the necessary scope and structure. (Variations of this objective could be used in traditional lectures and courses, as well as in laboratory courses), conduct (or simulate) an experiment in the field of graphic technology (e.g. paper aging) and report the results, develop a mathematical model or computer simulations to correlate or interpret the results of the experiment, interpret data, that is, state and discuss several possible reasons for deviations between predicted and measured results in the experiment, choose the most likely reason and justify the choice, and formulate methods to confirm the explanation.

Course content (Syllabus) on a weekly basis:

1. Introduction and objectives. History of experimentation • Why experiment? • What is Experimental Design? • Components of an experiment • Conditions and concepts • Brief overview • More on experimental units • More on responses • Define how we obtained the modern scientific method • Define the important components of modern experimental design • Understand the basic principles of experimental design • Critically evaluate published examples of research using experimental design • Impact and ethics in experimental research (evaluation of research) ♣ Follow proposed ethical principles 0.2 ECTS
2. Science and Scientific Method • Importance of Science o What is science? o What is the scientific method? o Does the scientific method work? o What is not a scientific argument? • Methods of Scientific Research o Theory o Concept o Problem o Hypothesis • Scientific Method o Assessment of the impact of relevant existing knowledge o Formulation of concepts and propositions o Establishment of hypotheses o Designing research to test hypotheses o Acquisition of meaningful empirical data o Analysis and evaluation of data o Providing explanation and defining new problems that have arisen from previous research • Assessment of the impact of relevant existing knowledge • Formulation of concepts and propositions • Establishment of hypotheses • Designing research to test hypotheses • Acquisition of meaningful empirical data • Analysis and evaluation of data • Providing explanation and defining new problems that have arisen from previous research • Research process • Defining the problem o Planning research design o Making decisions about the sampling procedure o Collecting data o Analyzing data o Formulating conclusions and preparing reports (article, presentation, etc.) • Non-scientific theories 0.34ECTS
3. Experimental design in different fields • Objectives of the experiment • General process (system) model • Uncontrollable factors • Why do we need an experimental design? • Types of systematic errors when taking samples • Approaches to experimentation • Experimentation costs • Experimental design process o Set goals o Define the measure of success o Performance check (rough estimate) o

Experimental design (precise assessment) o Starting the experiment o Data collection and analysis o Determining and verifying the experimental response o Acting based on the obtained results • Error resolution and propagation • Inference and inversion 0.34ECTS

4. Experimental Design in Different Fields - NOISE • Fundamental principles of experimental design o Replication o Randomization o Blocking • Nuisance factors o Controlled nuisance factor o Uncontrolled nuisance factor • Experimental design: NOISE • Examples of sources of noise o Statistical o Experimental o Observer (measurement) • From the list on the course website at the Faculty of Graphic Arts (only for professors interested in taking diploma students), find a professor whose research interests spark the student's interest. • Discuss sample papers from student submissions. • Define research questions, hypotheses, sample sizes, etc. • Compare expectations in different fields. • Accurate correspondence with facts or with a desired quality, state, or event in one's approach • Conceptual process of experimental design. 0.34 ECTS

5. Visit to the laboratories at the Faculty of Graphic Arts: • From the list provided on the course website at the Faculty of Graphic Arts (only for professors interested in taking on diploma theses), find a professor whose research interests spark the student's interest. • Discuss sample works taken from student submissions. • Define research questions, hypotheses, sample sizes, etc. • Compare expectations in different fields. • Ensure accuracy and correspondence with facts or a desired level of quality, state, or event in the approach. • Conceptual process of experimental design. • Considering the context and research objectives expressed in the analysis of the aforementioned works, design experiments to test one's hypotheses, and then compare them with actual research designs. 0.34 ECTS

6. Foundations of Experimental Design (I): Causality, Variables, Control, Sampling

    - Advantages and disadvantages of causal research (experiments)
    - Different experimental designs
    - Efficiently design and evaluate experiments
    - Distinguish dependent, independent variables and parameters that occur in the experiment
    - Eliminate some combinations of independent variables to reduce the total number of data points (elimination strategies)
    - Make the experiment feasible within time and budget constraints
    - Additional considerations:
    - Reproducibility: Is there reason to believe that the accuracy of the measurement will increase if the experiment is repeated several times with the same independent variables and parameters?
    - Hysteresis: Is there reason to believe that the effect under study may depend on the rate or sequence in which independent variables change?

- Fatigue: Will their experimental subjects become less capable during the testing due to fatigue (fatigue can affect both the subject and the experimenter)?

0.35 ECTS

7. Basics of experimental design (II): Validity, reliability, types of experimental projects. • Design an experiment that serves to achieve its goal and meet its success criteria. • Define the best overall approach to achieve specific goal. • Establish the resources available at the disposal. • Using examples of experimental design, further develop issues of reliability, validity, and sampling. • Take the experimental design and hypotheses generated in the workshop during the first few weeks and refine them in terms of reliability, validity, and sampling. • Review and adopt the literature o credibility based on current research. o focus on placing students work in the given context. o efficiency avoiding unnecessary duplication of work. o professional ethics demonstrating awareness of previous research and using appropriate citations (otherwise risking appearing naive, arrogant, or dishonest). • Systematically collect bibliographic data • Distinguish between sources that can be accessed and those that cannot (Unpublished conference presentations, but not dissertations, personal websites, emails, and conversations) • Critically or evaluatively summarize information relevant to the research • Cite sources in accordance with applicable standards. 0.35 ECTS

8. Measurement in Experiment: Methods and Methodology • General concepts of measurement • Elements of measurement system • Definitions of measurement elements o Primary sensing element (provides some form of output) o Variable conversion element (converts data from one physical form to another) o Variable manipulation element (performs mathematical operations on data) o Data transmission element (transfers data between measurement elements) o Data storage/reproduction element (stores data for later retrieval) o Data display element (provides data in a human-readable form) • Error analysis • Objectives of measurement o Measuring the appropriate quantity o Measuring with appropriate accuracy • Understanding measuring devices o Accuracy and precision o Static sensitivity o Zero drift and offset o Linearity o Resolution o Threshold o Hysteresis (insensitivity) o Readability o Range o Dynamic performance • Instrumental analysis • Calibration procedures • Analytical signal • Instruments - basic components • Calibration procedures 0.35 ECTS
9. Introduction to descriptive statistics • Concisely and effectively present (in writing or orally) statistical results • Use appropriate statistical software and virtual environments for efficient learning • Experience in effectively conducting appropriate statistical calculations • Coherently summarize and critically analyze information from different sources. 0.34 ECTS

10. Error analysis (uncertainty analysis) I

· Error and uncertainty · Use of uncertainty analysis o Evaluate experimental procedures including identifying potential difficulties o Identify instruments and procedures that monitor accuracy and precision o Inform us when an experiment cannot meet the desired accuracy · Uncertainty estimation and hypothesis testing · Understand and use measures of central tendency, median, mode, and range. · Use and interpret statistical measures, tables, and diagrams. · Use appropriate testing procedures. 0.34 ECTS

11. Error analysis (uncertainty analysis) II

    - One variable: o Calculate and use measures of central tendency o Understand what measures of central tendency (e.g. mean, median, mode) indicate about the distribution o Detect gross errors o Calculate weighted mean o Calculate mean and variance for grouped data o Calculate and use measures of variability
    - Two variables: o Calculate and use measures of association
    - Covariance, correlation coefficient
    - Determine whether the design adequately addresses external variables by: o Controlling for such variables o Blocking on such variables o Replicating o Randomizing 0.34 ECTS

12. Induction and Pattern Recognition • Methods and logic of sampling • Types of explanations • Randomness • Correlation • Scatter plots • Extrapolation and interpolation • Correlation statistics • Nonlinear relationships • Conclusions drawn from correlation • Perspectives on causality o Correlation or causation? 0.34 ECTS

13. Information Manipulation • Well-chosen average • Mean and median • Bias in graphical representation • Factor of deception • Nature of statistics • Ubiquity of statistics • Primary uses o Descriptive statistics o Research statistics o Discriminative techniques o Predictive statistics • Statistical manipulation • Deceptive graphs and statistics • Ways of manipulating graphs o Distorting results with a graph o Precautions in relation to graphs o Deceptive backgrounds o What should a graph tell us? • Types of sampling bias o Incorrect sampling o Leading questions o Incorrect interviewing o Lack of understanding or knowledge of the person being interviewed o False responses 0.34 ECTS

14. Presentation of research proposal; conclusions on experimental research I • Generate a basic experimental design and corresponding hypotheses • Analyze and evaluate a published research article using an experimental design. (written seminar paper) • Design and propose an experimental study on a topic of interest. In addition to collecting data, all steps of the research will be created, presented, and discussed. (oral presentation) 0.34 ECTS

15. Presentation of research proposal; conclusions on experimental research II • Generate a basic experimental design and corresponding hypotheses • Analyze and evaluate a published research article using an experimental design. (written seminar paper) • Design and propose an experimental study on a topic of interest. In addition

to collecting data, all steps of the research will be created, presented, and discussed. (oral presentation) 0.34 ECTS

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☐
activities in class ☒	test report ☐	oral exam ☒	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☒

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks	☐ Multiple choice tasks
☐ Alternative choice tasks	☐ Connecting and arranging tasks
☐ Problem solving tasks	

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:

• Final exam • Seminar work on a chosen topic - creating a quality seminar frees the student from writing written part of the exam • Written part of the exam • Oral part of the exam - oral knowledge check

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: • lecture attendance records • records of seminar attendance

Student evaluation (survey) ☒

Other:

Refrences

Required: 1. Gary W. Oehlert: A First Course in Design and analysis of Experiments, University of Minnesota, 2010 2. DESIGN AND ANALYSIS OF EXPERIMENT, Douglas C. Montgomery, John Wiley and sons Inc., 1997

Optional: 1. SCIENTIFIC METHODS, Richard D. Jarrard, (online book), Dept. of Geology and Geophysics, University of Utah, jarrard@mines.utah.edu, 2001; 2. How to Lie with Statistics, Darrell Huff, W.W. Norton & Company Inc, 1954; 3. The Design of Experiments (9th ed.). Fisher, Ronald A., Macmillan (1971) [1935]

Name of the course: Broadband network applications

Teacher: Odaberite stavku. Tibor Skala

Associate teachers:

Lectures (L): Tibor Skala

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB): Vladimir Cviljušac

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L + LAB Odaberite stavku.

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+0+2

ECTS credits: 6

Study programme: Graduatetavku. Status of the course: Odaberite stavku.

Semester: Odaberite stavku. winter Semester number: Odaberite stavku. III

Possibility of teaching in English: Odaberite stavku. For foreign students

Course objectives: Knowledge of broadband technologies and training for independent broadband design applications for mobile technologies and optimization of multimedia content for broadband applications. Electromagnetic spectrum and digital communications. Information transfer media: copper wire, optical fiber, radio transmission, satellite transmission, microwave, infrared and laser. Definition throughput, bandwidth and long distance communication. Broadband networks. The basics digital telephony, ISDN and development towards broadband connectivity. Types of broadband access: xDSL technologies, optical technologies, electric power network lines (PLC), satellite technology and wireless connections. Interactive broadband multimedia communications. Application of XML language for describing data content and filtered projected rendering via XSLT and SVG technology for different types of display technologies and operating systems in broadband network devices. The use of HTML5 and CSS3 technology in multimedia applications in broadband networks applications.

Enrollment requirements: Kliknite ovdje da biste unijeli tekst.

Prerequisite for taking the course exam: Completed colloquiums and tests following lectures, and attended exercises

General And Specific Competence and learning outcomes of the course:
Students will know: Preparation of complex design tasks for the design and realization of a graphic product in accordance with resources. Valorization of the elements of a particular phase of the implementation of the plan in relation to the set task (plan research, production, design). Planning and evaluation of processes and necessary resources in accordance with the development of graphic technology. Application of graphic engineering knowledge in the

field of functional applications (printed electronics, prototyping, bioprinting, mobile applications). Modeling of the graphic process with highly structured programming languages. Optimization of process procedures in graphic reproduction. Developing ideas for shaping and communicating visual messages in the form of new media. Analyze the electromagnetic spectrum and types of media for information transmission. To compare bandwidths, bandwidths and the impact of noise on communications over long distances. Distinguish types of broadband access. Design broadband applications for mobile technologies. Optimizing multimedia content for broadband applications.

Course content (Syllabus) on a weekly basis:

1. Lecture: Electromagnetic spectrum and digital communications;

   Exercises: Creating short programs using HTML5 technology (0.3 ECTS)

2. Lecture: Information transmission media: copper wire, optical fiber;

   Exercises: Creating short programs using HTML5 technology (0.3 ECTS)

3. Lecture: Information transmission media: radio transmission, satellite transmission, microwave, infrared and laser;

   Exercises: Creating short programs using HTML5 technology (0.4 ECTS)

4. Lecture: Definition of Bandwidth, Bandwidth and Long Distance Communications;

   Exercises: Creating programs using HTML5 technology (0.4 ECTS)

5. Lecture: Broadband networks;

   Exercises: Creating programs using HTML5 and CSS3 technology (0.4 ECTS)

6. Lecture: Basics of digital telephony, ISDN and development towards broadband connectivity;

   Exercises: Creating programs using HTML5 and CSS3 technology (0.4 ECTS)

7. Lecture: Types of broadband access: xDSL technologies;

   Exercises: Creating a program using HTML5 and CSS3 technology, colloquium (0.5 ECTS)

8. Lecture: Types of broadband access: optical technologies, lines

   power networks (PLC);

   Exercises: Creating programs using XML, HTML5 and CSS3 technologies (0.4 ECTS)

9. Lecture: Types of broadband access: satellite technologies;

Exercises: Creating programs using XML, HTML5, CSS3 and Javascript technologies (0.4 ECTS)

10. Lecture: Types of broadband access: wireless connections;

    Exercises: Creating programs using XML, HTML5, CSS3 and Javascript technologies (0.4 ECTS)

11. Lecture: Interactive broadband multimedia communications;

    Exercises: Creating an interactive application for broadband use (0.4 ECTS)

12. Lecture: Application of XML language for description of data content and filtered design display for different types of display technologies and operating systems in broadband network devices;

    Exercises: Creating an interactive application for broadband use (0.4 ECTS)

13. Lecture: Application of XML language for description of data content and filtered design display for different types of display technologies and operating systems in broadband network devices;

    Exercises: Creating an interactive application for broadband use (0.4 ECTS)

14. Lecture: HTML5 and CSS3 technologies in multimedia applications in broadband network applications;

    Exercises: Creating an interactive application for broadband use (0.4 ECTS)

15. Lecture: HTML5 and CSS3 technologies in multimedia applications in broadband network applications;

    Exercises: Creating an interactive application for broadband use, colloquium (0.5 ECTS)

Format of instructions:

lectures ☐ x	laboratory ☐	online ☐
seminars and workshops ☐	multimedia and internet ☐ x	field work ☐
exercises on computers ☐ x	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☐ x	research ☐	project ☐		practical work ☐
activities in class ☐	test report ☐	oral exam ☐	x	portfolio ☐

seminar work ☐ experimental work ☐ continuous knowledge examination ☐

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks ☐ Multiple choice tasks

☐ Alternative choice tasks ☐ Connecting and arranging tasks

☐ Problem solving tasks

Other: Assessment and evaluation of students' work during classes and on the final exam: Normative assessment (examination is longer and larger units, tasks, average weights are examined).

Assessment and evaluation of students' work during classes and on the final exam:

Kliknite ili dodirnite ovdje da biste unijeli tekst.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐ x

Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: Marlyn Kemper Littman, Building Broadband Networks CRC Press, Jun 3, 2002 - Technology & Engineering A.Salminen, F. Tompa , Communicating with XML, ISBN 978-1-4614-0991-5, e-ISBN 978-1-4614-0992- 2, Springer, 2011 Pap, Klaudio. Razvoj grafičkih jezika baziranih na XML-u // Tiskarstvo 03 / Lovreček, Mladen (ur.). Zagreb : FS, 2003. 141-143 Craig Cook, Jason Garber, Foundation HTML5 with CSS3, ISBN 978-1-43 02-3876-8, 2012, Springer Gavin Williams, Learn HTML5 and JavaScript for Android, ISBN 978-1-4302-4347-2, 2012, Springer

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Graphic product design

Teacher: asst. prof. PhD. Jurica Dolić

Associate teachers:

Lectures (L): Kliknite ili dodirnite ovdje da biste unijeli tekst.

Seminar (S):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L + LAB

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 1 + 3

ECTS credits: 4

Study programme: Graduate Status of the course: Mandatory

Semester: Winter Semester number: III

Possibility of teaching in English: Only for foreign students

Course objectives:Through lectures and exercises, students master the basic processes of product development, including its visual identity, the principles of designing information systems on three-dimensional packaging, as well as the stylistic, typographic, and pictorial elements involved in packaging design.

Enrollment requirements: Advanced knowledge of principles and techniques of graphic design.

Prerequisite for taking the course exam: Regular attendance of lectures and exercises. Successful completion and timely submission of assignments. Successful completion of the final project.

General And Specific Competence and learning outcomes of the course:
Evaluate technical and design solutions in the field of packaging.
Design and construct new packaging products.
List and apply design principles for packaging form and visual design.
Define a design approach to packaging identity based on the product category.
Design a new packaging model in accordance with defined objectives.

Course content (Syllabus) on a weekly basis:

1. Introduction (definition of student rights and responsibilities, overview of exercises, overview of literature, presentation of previous student works, specification of necessary equipment)

2. Historical and stylistic aspects of packaging design (0.25 ECTS)

What is packaging design, purpose and intent – case studies

3. Brand design and product identity basics (0.25 ECTS)

   Presentation of the product name (concept)

   Introduce brand design and product identity basics

4. Form follows feeling - response to brief (0.25 ECTS)

   Measurement of packaging design success with regard to design approach

5. Setting the goals and guidelines for design (0.25 ECTS)

   - intended audience (target group)
   - fundamental functional and emotional values of the product

6. Design benchmarking basics (0.25 ECTS)

   - point of sale analysis (notes, photographs)
   - product category analysis (in the form of discussion notes)
   - design index (examples of brands and packaging)
   - setting the goals and design guidelines

7. Graphic signs and symbols | Classification of marks (0.25 ECTS)

   Find examples of:

   - descriptive marks
   - metaphorical marks
   - non-figurative marks
   - typographic marks

8. Innovation in packaging design (0.25 ECTS)

   Development of the chosen concept (typography, photography, brand, packaging form, samples, line coding system)

9. The impact of packaging design on purchasing decisions (0.25 ECTS)

   - set the goals and design guidelines - structural design
   - brand name proposals
   - ideas and sketches (hand-drawn on paper) of brand identity and packaging

10. Packaging and sustainability (0.25 ECTS)

    - economic dimension - reduce costs/recycling/emissions of harmful gases

11. Packaging and sustainability (0.25 ECTS)

    - ecological dimension - development of materials and technologies

- printing and finishing
- reduction of excess packaging and increasing the use of recyclable materials

12. Packaging and sustainability (0.25 ECTS)

- social dimension - improve product handling
- improve practical use of the product
- improve visual design – facilitate the visual search for the product and make the product stand out

13. Labelling / information on packaging (0.25 ECTS)

- mandatory elements (on the primary display panel)
- additional elements (on the primary display panel)

14. Shelf Ready Packaging (0.25 ECTS)

- development / refinement of brand and packaging
- packaging dielines (label, box, etc.) in 1:1ratio
- development of promotional tools

15. Final presentation (0.75 ECTS)

- prepare a final presentation.

Format of instructions:

lectures ☒	laboratory ☐	online ☒
seminars and workshops ☐	multimedia and internet ☐	field work ☐
exercises on computers ☒	independent assignments ☐	work with mentor ☐
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☐	practical work ☒
activities in class ☒	test report ☐	oral exam ☐	portfolio ☐
seminar work ☐	experimental work ☒	continuous knowledge examination ☐	

Type of written examination:

Essay type assignment ☐

Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☐ Multiple choice tasks
☐ Alternative choice tasks
☐ Connecting and arranging tasks
☐ Problem solving tasks

Other:Project documentation

Assessment and evaluation of students' work during classes and on the final exam: Students are expected to participate in weekly discussions and provide critical reviews on lectures and exercises. Active engagement in class, regular completion of assignments, and a collaborative approach are significant components of the final grade. Enthusiasm, creative thinking, problem-solving, and sharing information with others are also valued as grading components. Students' attitude and continuous participation, responsibility, and respect for the teacher and fellow students are crucial for the successful completion of the course. Students are required to bring a sketchbook - a notebook without lines - and a pen or coloured markers to lectures and exercises.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☐
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: Ambrose, G., Harris P., “Packaging the brand : the relationship between packaging design and brand identity”, Lausanne : AVA Publishing, 2011.
Mollerup P., "Marks of Excellence – The history and taxonomy of trademarks", 1999.
Wheeler A. "Designing Brand Identity: An Essential Guide for the Whole Branding Team"
Calver, G., “What is packaging design?”, RotoVision, 2007.

Optional: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Name of the course: Business Communication

Teacher: asst. prof. PhD. Daria Mustić

Associate teachers:

Lectures (L): Daria Mustić

Seminar (S):Daria Mustić

Laboratory (LAB):Kliknite ili dodirnite ovdje da biste unijeli tekst.

Type of instructions (*L- lectures; S- seminars; LAB -laboratory*): L+S

Type of instructions presented as number of hours L+S+LAB on a weekly basis: 2+2+0

ECTS credits: 6

Study programme: Graduate Status of the course: Elective

Semester: Winter Semester number: III

Possibility of teaching in English: Only for foreign students

Course objectives:Introducing students to the historical and theoretical aspects of the culture of business communication and business ethics (from culture of communication to culture of living), ethological aspects of business communication, behavior, action and market survival; defining the term and definition of business ethics: virtues, principles, rights, codes, norms and business etiquette. Students should be able to explain, recognize and practically use the symbolic systems of the overall culture of business communication; overcome traditional business communication paradigms; theories of business communication; to look at business communication in the atmosphere of different business cultures with application to intercultural communication and intercultural management; master the fundamental operational concepts which determine "public relations", propaganda, the public, public opinion and the new constitutive elements of transparent business communication; creating a business image (brand) in public - positive business image; business appearance: business sign (name, logo, grapheme, symbol, Trade Mark, Country Style, Region Style, City Style, House Style), and culture literary-print genres of business communication. Training students to use basic forms of business textual, tabular, graphic and pictorial business messages.

Enrollment requirements: none

Prerequisite for taking the course exam: preparation of a seminar paper and presentation on a given topic

General And Specific Competence and learning outcomes of the course:
Students will be able to apply and understand the specifics of written and oral business communication, basic documents of business content, practically apply the way of writing a resume, motivational letters and applications for employment, form a business

communication strategy, and develop advanced business self-presentation skills; manage public business communication and business image.

Course content (Syllabus) on a weekly basis:

1. Introductory lecture (definition of rights and duties of students, definition of literature), Defining basic theoretical terms
2. Historical and theoretical aspects of the culture of business communication and business ethics
3. Concept and definition of business ethics: virtues, principles, rights, codes, norms and business etiquette
4. Compiling messages for employment and interviews for employment, independent creation of a resume,applications for employment and writing a motivational letter
5. Mastering team and interpersonal communication, simulated business exercise meeting
6. Basic forms of business textual, tabular, graphic and pictorial business messages,exercise of independent writing of business messages, business letters (memorandum, short messages, messages with negative and positive news)
7. Communicative cultural business dimensions; business individualism and business collectivism
8. Creating a business image in the public, independently designing a company name, mission and vision, and business sign of the company.
9. Crisis communication, creating a crisis communication plan (group work)
10. Business communication in the atmosphere of different business cultures; Intercultural communication and intercultural management
11. Communication and strategy, the task of preparing a communication strategy in accordance with the mission and vision companies, choosing suitable communication channels
12. Part I: Public relations
13. Part II: Part I: Relations with the public
14. Business communication skills, independently present the company from the seminar task
15. Business motivation and communication, evaluation of seminars

Format of instructions:

lectures ☒	laboratory ☐	online ☐
seminars and workshops ☒	multimedia and internet ☐	field work ☐
exercises on computers ☐	independent assignments ☒	work with mentor ☒
other: ☐		

Monitoring of students' work:

attending classes ☒	research ☐	project ☒	practical work ☐
activities in class ☐	test report ☐	oral exam ☐	portfolio ☐
seminar work ☒	experimental work ☐	continuous knowledge examination ☒	

Type of written examination:

Essay type assignment ☐
Objective-type tasks (multiple items can be selected):

☐ Guessing and completion tasks
☐ Multiple choice tasks
☐ Alternative choice tasks
☐ Connecting and arranging tasks
☒ Problem solving tasks

Other:Kliknite ili dodirnite ovdje da biste unijeli tekst.

Assessment and evaluation of students' work during classes and on the final exam:
Evaluation of independent assignments and the final project assignment.

Other: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Teaching process evaluation: Kliknite ili dodirnite ovdje da biste unijeli tekst.

Student evaluation (survey) ☒
Other: Kliknite ovdje da biste unijeli tekst.

Refrences

Required: B. Bebek, A. Kolumbić: Poslovna etika, Sinergija, Zagreb, 2000.; B. Gates: Poslovanje brzinom misli, Izvori, Zagreb, 1999.;
M.Plenković: Poslovna komunikologija:Kultura poslovnog komuniciranja, Hrvatsko komunikološko društvo & Nonacom, Zagreb, 2003.;
M.Plenković: Poslovna komunikologija, Alinea, Zagreb, 1991.; J.Plenković (Ed.): Profesionalna etika, Hrvatsko komunikološko društvo & Nonacom, Zagreb, 2003.

Optional: S.R. Covey: 7 navika uspješnih ljudi: povratak etici karaktera, Franklin Covey/Mozaik knjiga, Zagreb, 1988.; B.P. Crosby: Kvaliteta je besplatna, Privredni vjesnik, Zagreb, 1989.
V.Grahovac (Ed.): Business communication and mass media / Poslovno komuniciranje i masovni mediji, Alinea, Zagreb, 1992.