INFORMATION PACKAGE

I. SEMESTER –FUNDAMENTAL

Course

Name of Course: **COLOR MANAGEMENT IN DIGITAL SYSTEMS**

Code: **PDS 101**

Semester: I. Semester - fundamental

Teacher: Maja Strgar Kurečić, associate professor

Course Summary

Digital photo processing and the necessity of implementation of colour management system. Systems for image accepting, processing and formatting. Characteristics of reflective and transparent media. The role of densitometric and spectrophotometric measuring in color management system. Colour spaces are included in the colour management system. Input devices – digitalisators, characteristics. The principle of encoding and decoding of input device signals. Multiple image input – input compatibility. Monitor characteristics -gray scale, caliometric, the impact of flare. Image processing to output devices. System architecture for colour management. Creating profiles of input and output devices. Selecting appropriate transformation from the colour range that can display a single device in the colour range of another device. Transformations from one colour space to another colour space.

Outcomes and competencies aligned with the level 8.2 of the CroQF

Knowledge and ability to identify different factors affecting reproduction quality.
Critical evaluation of the problems that may arise during the process of color reproduction.
Autonomous application of advanced methods for the control of reproduction quality.
Familiarisation with the use of various measurement devices.
Ability to implement colour management systems in graphic production.

Description of teaching methods:

Tutorials

Compulsory literature:

1. Phil Green, (2010), Colour Management – Understanding and using ICC profiles, West Sussex, PO19 8SQ, United Kingdom, John Wiley & Sons Ltd.
2. Noboru Ohta, Alan R. Robertson, (2005), Colorimetry – Fundamentals and Applications, West Sussex, PO19 8SQ, United Kingdom, John Wiley & Sons Ltd.
3. B. Fraser, C. Murphy, F. Bunting, (2005), Real World Color Management - 2nd ed., Peachpit Press, Berkeley

Other literature:

1. Lindsay MacDonald, Ronnier Luo (editors),Colour Image Science (2002), West Sussex, PO19 8SQ, United Kingdom, John Wiley & Sons Ltd.

Number of lectures: 15

ECTS: 4

Teaching quality control:

Seminar paper. Oral exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Maja Strgar Kurečić, associate professor

E-mail: mstrgar@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Maja Strgar Kurečić, PhD is associate professor at the Faculty of Graphic Arts, Department of Reproduction photography, where she lectures in several graduate and postgraduate courses (Reproduction photography 2, Change of reproduction photography in modern media, Reproduction of visual information). She was assigned to 3 research projects supported by the Ministry of science and to one European – technological project as well. Currently, she has been working on a research project "Digitalization of museum painting heritage". The research area refers to graphic technology, digital photography and graphic design. Current research is focused on the development of a system of colour management in graphic reproduction process, as well as on accurate characterisation of digital photography system. In addition, she has been studying methods for dynamic range increase in photography. She is a member of organizational committees of several international and national symposiums. She is a member of Commission CIE - Division 8, TC8-09 (International Commission on Illumination). Apart from her scientific work, artistic photography is one of her main interests. She has exhibited her work in 10 solo and 25 group exhibitions both nationally and internationally. She has won many awards and is a member of ULUPUH (Croatian Association of Artists of Applied Arts).

Date of last academic appointment to the teaching and research position: September 6th 2010

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme:

1. Strgar Kurečić, Maja; Agić, Darko; Mandić, Lidija. (2011) Developing a custom color target for artwork imaging. Imaging science journal 59, 6; 317-331
2. Strgar Kurečić, Maja; Poljičak Ante; Mandić Lidija. (2013) A Survey on the Acceptance and the Use of HDR Photography Among Croatian Photographers. Acta graphica 1-2; 13-18
3. Poljičak, Ante; Mandić, Lidija; Strgar Kurečić, Maja. (2011) The Influence of Image Enhancement Filters on a Watermark Detection Rate. Acta graphica 22, 3-4; 53-60
4. Agić, Darko; Gojo, Miroslav; Strgar-Kurečić, Maja. (2011) Determination of equivalent-density domain in black compensation implementation for the selected profile. Tehnički vjesnik 18, 1; 63-68
5. Strgar Kurečić, Maja; Mandić, Lidija; Poljičak, Ante; Milčić, Diana. (2015)

6. Colour Management for High Quality Reproduction on Uncoated Papers. AIC2015 TOKYO Color and Image Proceedings / Steering Committee of AIC2015 TOKYO, The Color Science Association of Japan (ur.). Tokyo: Color Science Association of Japan (CSAJ), 633-638
7. Mandić, Lidija; Poljičak, Ante; Strgar Kurečić, Maja.(2014) The use of color in visual product message redesign. Proceedings of 7th International Symposium on Graphic Engineering and Design / Dragoljub Novaković (ur.).Novi Sad : University of Novi Sad Faculty of Technical Sciences, 423-426
8. Strgar Kurečić, Maja; Marijanović, Kristina. (2013) Difference of Pigment Behavior in Color Reproduction and Digital Media. Colour and Colorimetry - Multidisciplinary Contributions Vol.IX B / Rossi, Maurizio (ur.).
9. Santarcangelo di Romagna: Gruppo del Colore,225-261
10. Strgar Kurečić, Maja; Antonić, Davor; Vranjković, Ivana. (2013) Custom colour reference target for chronic wound photography. AIC Colour 2013 conference proceedings, MacDonald, Lindsay ; Westland, Stephen ; Wuerger, Sophie (ur.). Newcastle Upon Tyne : The Colour Group, 1353-1356

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme:

1. "Digitalizacija muzejske slikarske baštine", project manager: associate professor Darko Agić, January 2007 - Ocotber 2013, in the framework of the scientific program "Digitalni sustavi u tiskarstvu", 1281957.
2. „Metode evaulacije grafičkih korisničkih sučelja aplikacija namjenjenih korisnicima sa kompleksnim komunikacijskim potrebama“, project, short-term financial support to research, University of Zagreb, November 2013 - June 2014
3. Cost FP 1104 „New possibilities for print media and packaging - combining print with digital“, 2012/16

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **CHEMICAL ANALYSIS OF GRAPHIC MATERIALS**

Code: **PDS 102**

Semester: I. Semester - fundamental

Teacher 1: Željka Barbarić-Mikočević, associate professor

Teacher 2: Mirela Rožić, full professor

Course Summary

The meaning of chemical analysis and its application in chemical identification and separation of the sample during the technological process. Sampling, testing and analysis of data related to graphic materials. Conducting analytical process from sample to optimal information. Chemical laws in methods of identification and separation of analytes. System approach to chemical analysis. Sample (representative sample) and sampling. Preparation of sample for analysis. Degradation and dissolution of the sample. Separation of analytes (removal of remaining matter). Choosing a method for expressing analytical procedures. Gravimetric determination (reaction stoichiometry, gravimetry calculations, sediment properties and reagents for precipitation). Titrimetry (acid-base reactions, potentiometric titrations, conductometric titrations, oxidoreduction titrations, polyelectrolyte titrations, complexometric titrations, permanganatometry, iodometry, bromatometry, precipitation titration). Separation (filtration, dialysis, separation based on particles' size, centrifugation, distillation, precipitation, ion exchange, extraction, evaporation, recrystallization, sublimation) and chromatographic methods (chromatographic analysis – gas chromatography GC, CC column chromatography, PC paper chromatography). Spectroscopic methods (spectroscopies in the visible and infrared area – FTIR – spectrophotometer). Evaluation of analytical data. Errors in the analytical system. Measurement uncertainty.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- skills to conduct laboratory experiments to test the chemical composition of fiber
- ability to plan the sequence of processing operations and to develop research skills
- ability to apply, connect and combine basic knowledge in research
- basic laboratory skills and laboratory safety rules
- teamwork skills
- basic knowledge about materials analysis based on sampling, choice of methods and interpreting results
- general knowledge in the field of natural sciences (analytical chemistry)

Description of teaching methods:

Tutorials, review of bibliography

Compulsory literature:

1. Roberts, J.C,. (1996), Paper Chemistry, Chapman & Hall, Great Britan
2. Rowell, R. M., (2013), Handbook of Wood Chemistry and Wood Composites, Second Edition, Taylor & Francis Group, US

3. Run-Cang Sun, (2010), Cereal Straw as a Resource for Sustainable Biomaterials and Biofuels - Chemistry, Extractives, Lignins, Hemicelluloses and Cellulose, Elsevier, UK

Additional literature:

1. Skoog, D.A., West, D.M., Holler, F.J., (1999), Osnove analitičke kemije, ŠK, Zagreb
2. Kellner,R., Mermet , J. M., Otto, M., Widme, H.M., (2006), Analytical Chemistry, Wiley-VCH
3. Harris, D. C. (2001), Quantitative Chemical Analysis, W.H.Freedman and Co. New York
4. Šoljić, Z. (1998), Računanje u kvantitativnoj kemijskoj analizi, Sveučilište u Zagrebu, Zagreb
5. Šoljić, Z. , Kaštelan-Macan, M., (2002), Volumetrija, FKIT, Zagreb
6. Šoljić, Z., (2006), Laboratorijske osnove kvantitativne kemijske analize, FKIT, Zagreb
7. Kaštelan-Macan, M. (2003), Kemijska analiza u sustavu kvalitete, ŠK, Zagreb

Number of lectures: 20

ECTS: 5

Teaching quality control:

Writing a seminar paper based on bibliography data and laboratory researches.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher 1

Name and Surname Željka Barbarić-Mikočević, associate professor

E-mail: zbarbarir@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Associate professor Željka Barbarić-Mikočević was born on 10. June 1965 in Sisak. She graduated in 1988 from the Faculty of Technology, University of Zagreb.

In 1989 she was employed at the Department of Chemistry of the Faculty of Graphic Arts in Zagreb. In 1999 she defended her master's thesis with the topic "Chromatographic monitoring mobility of pesticides in the soil" at the Department of Analytical Chemistry of the Faculty of Chemical Engineering and Technology, University of Zagreb, under the mentorship of professor Marija Kaštelan-Macan.

In 2004 she defended her doctoral thesis entitled "Mechanism od deinking prints in some techniques of digital printing" under the mentorship of professor Zdenka Bolanča at the Faculty of Graphic Arts in Zagreb.

She was associate on the following projects:

1. „Mehanizmi deinkinga otisaka digitalnog tiska" (128003); key researcher: Zdenka Bolanča, 2002 - 2004
2. „Mehanizmi enzimatskog deinkinga digitalnih otisaka i karakteristika otpadnih voda" - bilateral Croatian-Slovenian cooperation in the fielf of science and technology; key researcher: Zdenka Bolanča, 2003 - 2005

3. „Nove formulacije materijala, karakteristike otisaka i čimbenici okoliša", 2007
4. „Characterisation of paper surfaces for improved printing paper grades" COST Action E32
5. „Improvements in the understanding and use of de-inking technology" COST Action E46, two related lectures: „Increasing the efficiency of deinking flotation of Indigo prints", Girona (2006) and „The influence of the printing technique (conventional/digital) on the deinking effectiveness", Grenoble (2006).

Date of last academic appointment to the teaching and research position: March 14th 2011

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Plazonić, I., Barbarić-Mikočević, Ž., Džimbeg-Malčić, V., (2015), Optical stability of office papers treated with cocamidopropyl betaine, Wood Research, 60 (2), 263-272.
2. Barbarić-Mikočević, Ž., Plazonić, I.; Džimbeg-Malčić, V., (2013), The deinkability improvement of offset prints made from a two-side coated substrate, BioResources, 8, 557-570.
3. Džimbeg-Malčić, V., Barbarić-Mikočević, Ž., Itrić, K., (2012), Kubelka-Munk theory in describing optical properties of paper (II), Tehnički vjesnik, 19 (1), 191-196.
4. Plazonić, I., Džimbeg-Malčić, V., Barbarić-Mikočević, Ž., (2012), A novel Eco-alkali chemistry in newspaper flotation deinking, Acta graphica, 23, 91-98.
5. Džimbeg-Malčić, V., Barbarić-Mikočević, Ž., Itrić, K., (2011), Kubelka-Munk theory in describing optical properties of paper (I), Tehnički vjesnik, 18 (1), 117-124.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Fund manager of the following research projects:

1. "Slama pšenoraži kao izvor vlakanaca u proizvodnji novinskog papira", ac. year 2013/2014,
2. "Slama žitarica kao izvor primarnih vlakanaca u proizvodnji novinskog papira", ac. year 2014/2015
3. "Utjecaj ne-drvnih vlakanaca na kemijsku stabilnost grafičkog proizvoda" ac. year 2015/2016.

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 1

Teacher 2

Name and Surname Mirela Rožić, full professor

E-mail: mrozic@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Full professor Mirela Božić, MSc, PhD graduated from Faculty of Chemical Engineering and Technology, University of Zagreb in 1994. Since 1994 she has been a teaching assistant at the Faculty of Graphic Arts in Zagreb, Department of Chemistry in Graphic Technology. She started her postgraduate studies at the Faculty of Chemical Engineering and Technology, University of Zagreb, Department of Chemistry in Graphic Technology and completed her Master's Degree in natural science discipline, field chemistry in 1999. She completed her

doctoral thesis at the Faculty of Chemical Engineering and Technology and was awarded a PhD degree in natural science discipline, field of chemistry in 2002.

She was appointed to the position of research associate in 2005 and to the teaching and research position of an associate professor in engineering science discipline, field of graphic technology. She was a lecturer in several groups of chemistry courses in graphic technology. Furthermore, she was appointed senior research associate on 12 May 2009, and to research and teaching position of associate professor, as well as to the position of research fellow on 17 June 2011.

Date of last academic appointment to the teaching and research position: July 21st 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Rožić, M., Kulčar, R., Jamnicki, S., Lozo, B., Gregor-Svetec, D., (2015), The UV stability of thermochromic ink on paper containing clinoptilolite tuff as a filler, Cellulose chemistry and technology, 49 (7-8), 693-699.
2. Bennani, Y., Košutić, K., Dražević, E., Rožić, M., (2012) , Wastewater from Wood and Pulp Industry Treated by Combination of Coagulation, Adsorption on Modified Clinoptilolite Tuff and Membrane Processes, Environmental technology, 33 (10), 1159-1166.
3. Gregor-Svetec, D., Rožić, M., Muck, T., Lozo, B., (2012), Natural zeolite as a filler in the base ink jet paper sheet, Nordic pulp & paper research journal, 27 (4), 721-728.
4. Ćurković, L., Trgo, M.,Rožić, M., Vukojević Medvidović, N., (2011), Kinetics and thermodynamics study of copper ions removal by natura clinoptilolite, Indian journal of chemical technology, 18 (2), 137-143.
5. Rožić, M., Miljanić, S., (2011), Sorption of HDTMA cations on Croatian natural mordenite tuff, Journal of hazardous materials, 185 (1), 423-429

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

- 2007 – 2010 "Interrelation of mineral bearers and fosphateremoval of waste water bacteria" project code: 119-1191155-1203, Ministry of science of the Republic of Croatia
- 2007 - 2012 "Membrane and adsorption procedures of organic matter removal in water processing" project code: 125-1253008-3009, Ministry of science of the Republic of Croatia

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **NANOTECHNOLOGY AND THE ENVIRONMENT**

Code: **PDS 104**

Semester: I. Semester - fundamental

Teacher: Ivana Bolanča Mirković, associate professor

Course Summary

Nanoscience, nanotechnology, nanoparticles and nanomaterials. Application of nanotechnology in graphic reproduction and the production of materials, in consideration of product lifecycle. Nanotechnology in the production of paper and recycled paper, coatings, dyes and adhesives. Nanocomposites, packaging and the environment. Nanolithography. Nanostructured catalysts. Impacts of nanotechnology on the environment. The use of nanotechnology in the field of environmental protection. Sensors in the domain of nanotechnology tracking biological and chemical factors of environment. Energy and nanotechnology.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to implement nanomaterials into printing processes
- familiarization with advantages and disadvantages of nanomaterials

Description of teaching methods:

Lectures, tutorials

Compulsory literature:

1. Wiesner, M., BotteroY.J., Environmental nano-technology: Application and implication of nanomaterials, Mc Graw Hill, New York, 2007
2. Ram M., Andreesen E.S., Nano-technology for environmental decontamination, Mc Graw Hill, New York, 2011
3. Shatkin J.A., Nanotechnology; Health and environmental risks, Secund edition, CRC Press. New York,

Additional literature:

1. Kathleen Sellers, Christopher Mackay, Lynn L. Bergeson, Stephen R. Clough, Marilyn Hoyt, Julie Chen, Kim Henry, Jane Hamblen, Nanotechnology and the Environment, CRC Press , 2008
2. Mark Wiesner, Jean-Yves Bottero, Environmental Nanotechnology: Applications and Impacts of Nanomaterials, Mc Graw Hill

Number of lectures: 30

ECTS: 7

Teaching quality control:

Seminar paper, exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Ivana Bolanča Mirković, associate professor

E-mail: ibolanca@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Associate professor Ivana Bolanča Mirković was born on 7. June 1976 in Zagreb. After graduating from the Grammar school for science and mathematics, she enrolled into the Faculty of Science in Zagreb, Department of Chemistry, where she received her degree in 2002. The title of her final thesis was "Determination of Elements in Drinking Water by Atomic Spectrometry and Complexometry". She started working at the Faculty of Graphic Arts of the University in Zagreb in the same year and on 23. May 2005 she defended her master's degree entitled "Deinking Mechanisms in the Function of Prints Ageing" under the mentorship of the professor Adrijano Golubović.

Ivana Bolanča Mirković earned her doctor's degree on 20. June 2007, at the same Faculty with the topic "Ecologically suitable offset inks and deinking mechanisms of prints" under the mentorship of professor Klementina Možina.

On 1. April 2008 she was appointed assistant professor and in 2015 associate professor.

She participated in scientific projects and programs financed by the Ministry of Science, Education and Sport, as well as in bilateral scientific projects. She was also the project manager in several scientific projects and programs.

Ivana Bolanča Mirković takes a regular part in a number of international conferences, such as the Conference on Printing, Design and Graphic Communications "Blaž Baromić" In 2011 she was a member of the expert committee "International Council of Environmental Engineering Education."

She publishes regularly: she is the author of 12 book chapters, 11 papers in journals, 58 papers published in the proceedings of international conferences, 5 papers published in the proceedings of national conferences and 8 technical articles. She has also mentored 30 diploma theses, 12 bachelor and 12 master theses. She teaches several undergraduate, graduate and postgraduate courses: Industry and environment, Graphic design and environment, Science of environment and design, EMS, Packaging and environment, Nanotechnology and the Environment, Nanotechnology and the environment and New technologies and the environment.

Date of last academic appointment to the teaching and research position: May 25th 2015

List of scientific and art projectss assigned to in the last 5 year and which are relevant to the doctoral programme

1. Bolanča Mirković I., Majnarić I., Modrić M., Bolanča Z., Screens of the offset prints and ink content in recycling process, Scientific Papers of the University of Pardubice, Series A, 16 (2011) 36 -45, ISSN: 1211-5511, (Chemical Abstract)
2. Majnarić I., Bolanča Mirković I., Golubović K., Influence of UV Curing Varnish Coating on Surface Properties of Paper, Technical Gazette 19, 1(2012), 51-56, ISSN 1330-3651, (SCI-expanded)

3. Lajić B., Majnarić I., Bolanča Mirković I., Accelerated and natural ageing of offset prints covers with different varnishes, Nordic Pulp & Paper Research Journal. 28, 1(2013), 101-110. (Current Content)
4. Majnarić, Igor; Hladnik, Aleš; Muk, Tadeja; Bolanča Mirković, Ivana, The influence of ink Concentration and Layer thickness on Yellow Color Reproduction in Liquid Electrophotography Toner, Technical Gazette, 22, 1(2015), 145-149, ISSN 1330-3651, (SCI-expanded)
5. Sinđić, Igor; Bolanča Mirković, Ivana; Bolanča, Zdenka, Stability of wide format Ink Jet Prints for Outdoor application, Technical Gazette, 22, 5 (2015), ISSN 1330-3651, Online: ISSN 1848-6339, (SCI-expanded)
6. Bolanča Mirković, Ivana, Grafička industrija, nanoceluloza i zaštita okoliša, Proceedings of International Conference on Printing, Design and Graphic Communications, Miroslav Mikota (ur.)., Zagreb: HDG, 2015. 13-25
7. Džimbeg-Malčić, V., Barbarić-Mikočević, Ž., Itrić, K., (2011), Kubelka-Munk theory in describing optical properties of paper (I), Tehnički vjesnik, 18 (1), 117-124.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Fund manager of the following research projects:

1. "Nove formulacije grafičkih materijala, karakteristike otisaka i čimbenici okoliša" (128-1281955-1953) 2011-2014
2. "Studij materijala i procesa grafičke reprodukcije u funkciji održivog razvoja" (1281955) 2011-2014

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **RASTER ELEMENTS IN PRINTING**

Code: **PDS 105**

Semester: I. Semester - fundamental

Teacher 1: Igor Zjakić, associate professor

Teacher 2: Igor Majnarić, assistant professor

Course Summary

Achieving different dyes with raster: different surfaces, different thickness of the colour layers. Raster dot size. Structure of the raster dot in conventional and digital print. Transfer of the dye to different printing substrates. Growth and deformation of the raster dot on the print, halo. The impact of the basic printing material quality and printing techniques to the measurement results. Error in measurements. The correlation between measuring with physical appliances and visual experience of the viewer.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to explain all known methods of halftone printing and their application in graphic product
- familiarization with the process of preparing and optimizing colour illustrations and their impact on printing with conventional and digital printing techniques.
- ability to analyse the results of printing in combination with a number of printing substrates, colours and settings.
- skills to work on optical microscopes and colorimeters and apply the comparative analysis in order to obtain a general assessment
- ability to detect errors as well as their critical elimination in practice

Description of teaching methods:

Tutorials

Compulsory literature:

1. Gaurav, S. (2003) Digital Colour Imaging handbook, CRC Press
2. Daniel L. L., Gonzalo R. A. (2008) Modern digital halftoning, CRC Press

Additional literature:

1. Goldman, G. (2004) The World of Printers, OCE Printing Systems GmbH, Poing,. Germany
2. Gary J. A. C. Field, G. (2001) Principles of Color Reproduction, PIRA GATF Sewickley, USA
3. Gustavson, S. (1997) Dot Gain in Colour Halftones, Likoping University, Sweden
4. Shevell S. K. (2003)The Science of Color Second Edition, Elsevier, UK.

Number of lectures: 20

ECTS: 5

Teaching quality control:

Seminar paper and oral exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher 1

Name and Surname Igor Zjakić, associate professor

E-mail: izjakic@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Igor Zjakić graduated at the Faculty of Graphic Arts after completion of the Vocation school of graphic arts, programme type Printing. In 2000, he enrolled to postgraduate study at the Faculty of Graphic arts and in 2002 he became the first Master degree holder in Graphic technology in Croatia. In January 2005, he earned his doctoral degree at the Department of Printing at the Faculty of Graphic Arts, with a thesis entitled "Optimisation of grating system reproduction in print". Since 1993, he has been working at "Graf" as CEO, then in "AKD" as head of facilities and supervisor of technological processes as well as the CEO. He participated in the project for design of new Croatian passport and other protected documents. Until today, he has published more than 50 scientific and professional papers in Graphic technology, and has participated in many international and domestic professional conferences. He has authored several chapters published in international scientific books as well as several research papers in international journals with international review. In his 10-year experience in economy, he completed several courses related to graphic technology and management in Zurich, London and Budapest. For the last several years, he has been collaborating in the work of a scientific-professional conference "Blaž Baromić" as member of Program and Organisation Committee. He has also been a member of Program Committee of international conference DAAM headquartered in Wien, where he heads the part of "Graphic technology". At German organization IFRA, he is advisor for matters of quality in paper print. He wrote the following textbooks in the area of graphic technology and design: "Offset print quality management", "Colorimetry in multimedia systems" and "Psychology of colours".

Date of last academic appointment to the teaching and research position: July 13th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Skenderović-Božićević, M., Gajović, A, Zjakić, I., 2012, Identifying a Common Origin of Toner Printed Counterfeit Banknotes by micro-Raman Spectroscopy, Forensic Science International, Science Direct, 223, 314-320.
2. Dobrić, E., Bates I., Zjakić, I., 2013, The Influence of Impurities in Printing Substrate on the Deformation of Screeen Element and Dot Gain in Coldset Print, Technical Gazette 20,(5), 817-822.
3. Valdec D., Zjakić I., Milković, M, 2013, The influence of variable parameters of flexographic printing on dot geometry of pre-printed printing substrate, Technical Gazette, 20(4), 659-667.
4. Bates I., Zjakić I., Budimir I., (in press), Assessment of the print quality parameters' impact on the high-quality flexographic print visual experience, Imaging Science Journal

5. Zjakić, Igor; Parac-Osterman, Đurđica; Irena; 2011, New approach to metamerism measurement on halftone color images, Measurement 44, p.p. 1441-1447.
6. Zjakić, Igor; Parac-Osterman, Đurđica, Bates, Glogar Martinia Ira; 2011, Influence of a textile structure on raster value increase in screen printing, Tekstil 60 (1), p.p. 1-8
7. Bates, Irena; Zjakić, Igor; Milković, Marin; 2011, Lightfastness and weatherfastness of overprint pattern obtained on polymer substrates, Tehnički vjesnik, 18, 3; 349-356.,
8. Milković, Marin; Mrvac, Nikola; Zjakić, Igor; 2012, Comparative Analysis of the Intensity and Assimilation Effects of the Eqivalent Geometric Structures of Graphic Reproduction, TTEM, Vol. 7. No. 2., 5/6; 905-912.
9. Zjakić, Igor; Bates, Irena; Milković, Marin. 2011, A Study of Dot Gain and Gamut for Prints Made With Highly Pigmented Inks, Technical Gazette 18, 2,
10. Galić, Eduard; Ljevak, Ivana; Zjakić, Igor: 2014, The Effect of Thermal Lamination Processes on Colorimetric Change in Spot Colours, Acta graphica. 25 (2015), 3-4; 83-90
11. Bates, Irena; Petric Maretić, Katja; Zjakić, Igor: 2014, Determining the Quality of a Reproduction Obtained with Digital Thermal Printing Plates, Acta graphica. 25, 3-4; 63-72

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. 2007- 2013"Studij tehnoloških čimbenika grafičkog dizajna za sustavno unapređenje kvalitete" Code: 128-1281955-1962, Ministry of Science, Education and Sports of the Republic of Croatia
2. National scientific and research program of the Ministry of Science, Education and Sports: "Evaluacija grafičkih parametara u multimedijskom okruženju, project manager associate professor Igor Zjakić, University of Zagreb, Faculty of Graphic Arts (2014-2015.)

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 4

Teacher 2

Name and Surname Igor Majnarić, assistant professor

E-mail: majnaric@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Assistant professor Igor Majnarić was born of 21. July 1971. He has been a teacher at the Faculty of Graphic Arts since 1998. He currently teaches severeal courses, such as "Fundamental printing techniques ", "Digital printing techniques" and "Measurement in the priting and Peripheral printing unit". The focus of his scientific interest is the analysis of printing substrates and printing inks and their interaction during the printing process, as well as their influence on the final quality of print media products. The focus of his scientific work are NIP printing techniques (Electrophotography and Inkjet printing techniques).

In the framework of his scientific activities he participated in four national research projects and two bilateral Croatian-Slovenian projects. He also took part in two Erasmus scientific research exchange, one CEPPUS

scientific research exchange and held a series of lectures at the University of Ljubljana. So far Igor Majnarić has published over 70 scientific and professional papers in the field of graphic technology and graphic design. He is engaged as a permanent reviewer in four scientific journals, he is also a member of the organization committee of the MATRIB international conference and Apple Distinguished Educator for the Faculty of Graphic Arts. He is currently vice dean for academic affairs at the Faculty of Graphic arts and chair of committees for education and teaching. He is the author of faculty handbook entitled "Fundamentals of Digital Printing".

Date of last academic appointment to the teaching and research position: December 17th 2012

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Majnarić I., Bolanča S., Golubović K., "Neke karakteristike transfernih folija načinjenih tehnikom mlaza tinte te njihov utjecaj na kvalitetu otisaka na pamučnoj tkanini", Tekstil 59, 10, (2010), 456-462, ISSN 0492-5882 (SCI-expanded); CIT: 2
2. Rat B., Majnarić I., Možina K., Visibility of care labelling code symbols, Tekstil 60, 6, (2012), 251-257, ISSN 0492-5882 (SCI-expanded); CIT:1; IF (2012) 0,086; Q4 (21/21)
3. Majnarić I., Bolanča Mirković I., Golubović K. "Influence of UV Curing Varnish Coating on Surface Properties of Paper", Technical Gazette 19, 1(2012), 51-56, ISSN 1330-3651 (INSPEC); CIT:1; IF (2012) 0,601; Q3 (51/90)
4. Lajić B., Majnarić I., Bolanča Mirković I. "Accelerated and natural ageing of offset prints covers with different varnishes", Nordic pulp & paper research journal. 28, 1(2013), 101-110. (Current Content); IF (2012) 1,071; Q2 (6/22).
5. Možina K., Majnarić I., Rat B., Bernašek A. "Visibility of graphic elements on textiles", Industria Textila. 64 5 (2013), 266-272 (World Textiles; Scopus,VINITI, Chemical Abstracts, Journal Citation Reports/Science Edition, Science Citation Index Expanded (SciSearch), Materials Science Citation Index), Impact factor; IF (2012) 0,366; Q4 (18/22)
6. Majnarić I., Hladnik A., Muck, T., Bolanča Mirković I. "The Influence of Ink Concentration and Layer Thickness on Yellow Colour Reproduction in Liquid Electrophotography Toner", Tehnički vjesnik/Technical Gazette 22 1 (2015.), 145-149. ISSN 1330-3651 (print) ISSN 1848 6339 (on line) (INSPEC);
7. Krivec T., Muck T., Fugger Germadnik R., Golob G. Majnarić I. "Adapting Artworks for People Who Are Blind or Visually Impaired Using Raised Printing", Journal of visual impairment & blindness, 2014., 108 (1), pp. 68-76 (Scopus)
8. Ledić K., Majnarić I., Milardović Ortolan S., Špalj S., Štefančić S., Mehulić K., "Analysis of Translucency Parameter of Glass-Ceramics Fabricated by Different Techniques", Acta Stomatologica Croatica 2015, 49(1), pp. 27-35., (Scopus) DOI: 10.15644/asc49/1/4
9. Dolić J., Pibernik J., Majnarić I. "Influence of UV Varnish Pattern Effect on Print Quality", Journal of Imaging Science and Technology R 58(6): 060501-1-060501-9, 2014, Society for Imaging Science and Technology 2014.

10. Možina, K., Majnarić, I., Rat B. "Label Legibility Influenced by Different Number of White Ink Layers", Tehnički vjesnik/Technical Gazette 23 3 (2015.), DOI: 10.17559/TV-20150312204707, IF =0,579, ISSN 1330-3651 (print) ISSN 1848 6339 (on line) (Scopus, INSPEC, Index Expanded);
11. Jurič, I., Kašiković, N., Stančić, M., Novaković, D., Vladić, G., Majnarić, I. "The influence of heat treatment on print mottle of screen printed textile knitted fabrics", Applied Thermal Engineering, print ISSN 1359-4311, 50 (3) str.215-220, DOI: 10.1016/j.applthermaleng.2015.07.013 (Current Content); IF (2014) 2,739; Q1 (6/55).

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. 2007- 2013 "Nove formulacije materijala, karakteristike otisaka i čimbenici okoliša" Code: 0128-1281955-1953, Ministry of Science, Education and Sports
2. 2007- 2013"Studij tehnoloških čimbenika grafičkog dizajna za sustavno unapređenje kvalitete" Code: 128-1281955-1962, Ministry of Science, Education and Sports
3. Research support of the Ministry of Science, Education and Sports, "Evaluacija grafičkih parametara u multimedijskom okruženju", project manager Igor Zjakić, University of Zagreb Faculty of Graphic Arts (2014-2015.)

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **NEW TECHNOLOGIES AND THE ENVIRONMENT**

Code: **PDS 106**

Semester: I. Semester - fundamental

Teacher: Ivana Bolanča Mirković, associate professor

Course Summary

Principles of ecology. Technological development and ecosystem problems. Theoretical postulates of digital printing based on electrophotography, and its environmental impact. Comparison of LCA digital and conventional printing. Methods of analysis and the life cycle of electronic products. Ecological aspects of printing substrates, liquid and solid toners. Development of modern methods of analysis, level of emissions. Legislation and norms. Development and characteristics of other electronically controlled printing techniques. Theoretical postulates of the used prints disposal. Principles of electronic equipment disposal: landfilling, incineration, recycling. Environmental impact of electronical waste disposal. Postulates of development in the field of production and disposal of computer equipment, in terms of sustainable development.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to establish connection between digital printing techniques and their environmental impact
- ability to compare environmental impact of digital and conventional printing
- ability to assess environmental impact of computer equipment

Description of teaching methods:

Teaching, tutorials

Compulsory literature:

1. F. Shapiro, Environmental Regulations for Printers, Jelmar Publishing, 2003 W.C Jr. Blackman, Basic Hazardous Waste Management, CRC Press, 2001
2. R.J.Watts, Hazardous Waste, J.Wiley, 2000
3. B. Thompson, Printing Materials: Science and Technology, Pira International, Surrey, 2004
4. M.Z. Jacobson, Atmospheric Polution, University Press, Cambrige, 2002

Additional literature:

1. P. Thangavel, G. Sridevi, Environmental Sustainability: Role of Green Technologies, Springer, 2015

Number of lectures: 30

ECTS: 7

Teaching quality control:

Seminar paper, exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Ivana Bolanča Mirković, associate professor

E-mail: ibolanca@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Associate professor Ivana Bolanča Mirković was born on 7. June 1976 in Zagreb. After graduating from the Grammar school for science and mathematics, she enrolled into the Faculty of Science in Zagreb, Department of Chemistry, where she received her degree in 2002. The title of her final thesis was "Determination of Elements in Drinking Water by Atomic Spectrometry and Complexometry". She started working at the Faculty of Graphic Arts of the University in Zagreb in the same year and on 23. May 2005 she defended her master's degree entitled "Deinking Mechanisms in the Function of Prints Ageing" under the mentorship of the professor Adrijano Golubović.

Bolanča Mirković earned her doctor's degree on 20. June 2007, at the same Faculty with the topic "Ecologically suitable offset inks and deinking mechanisms of prints" under the mentorship of professor Klementina Možina. On 1. April 2008 she was appointed assistant professor and in 2015 associate professor.

She participated in scientific projects and programs financed by the Ministry of Sceince, Education and Sport, as well as in bilateral scientific projects. She was also the project manager in several scientific projects and programs.

Ivana Bolanča Mirković takes a regular part in a number of international conferences, such as the Conference on Printing, Design and Graphic Communications "Blaž Baromić" In 2011 she was a member of the expert committee "International Council of Environmental Engineering Education."

She publishes regularly: she is the author of 12 book chapters, 11 papers in journals, 58 papers published in the proceedings of international conferences, 5 papers published in the proceedings of national conferences and 8 technical articles. She has also mentored 30 diploma theses, 12 bachelor and 12 master theses. She teaches several undergraduate, graduate and postgraduate courses: Industry and environment, Graphic design and environment, Science of environment and design, EMS, Packaging and environment, Nanotechnology and the Environment, Nanotechnology and the environment and New technologies and the environment.

Date of last academic appointment to the teaching and research position: May 25th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Bolanča Mirković I., Majnarić I., Modrić M., Bolanča Z. "Screens of the offset prints and ink content in recycling process", Scientific Papers of the University of Pardubice, Series A, 16 (2011) 36 -45, ISSN: 1211-5511, (Chemical Abstract)
2. Majnarić I., Bolanča Mirković I., Golubović K. "Influence of UV Curing Varnish Coating on Surface Properties of Paper", Technical Gazette 19, 1(2012), 51-56, ISSN 1330-3651, (SCI-expanded)
3. Lajić B., Majnarić I., Bolanča Mirković I. "Accelerated and natural ageing of offset prints covers with different varnishes", Nordic Pulp & Paper Research Journal. 28, 1(2013), 101-110. (Current Content)

4. Majnarić, Igor; Hladnik, Aleš; Muk, Tadeja; Bolanča Mirković, Ivana, The influence of ink Concentration and Layer thickness on Yellow Colour Reproduction in Liquid Electrophotography Toner, Technical Gazette, 22, 1(2015), 145-149, ISSN 1330-3651, (SCI-expanded)
5. Sinđić, Igor; Bolanča Mirković, Ivana; Bolanča, Zdenka, Stability of wide format Ink Jet Prints for Outdoor application, Technical Gazette, 22, 5 (2015), ISSN 1330-3651, Online: ISSN 1848-6339, (SCI-expanded)
6. Bolanča Mirković, Ivana "Grafička industrija, nanoceluloza i zaštita okoliša", Proceedings of International Conference on Printing, Design and Graphic Communications, Miroslav Mikota (ur.)., Zagreb: HDG, 2015. 13-25
7. Džimbeg-Malčić, V., Barbarić-Mikočević, Ž., Itrić, K., (2011), Kubelka-Munk theory in describing optical properties of paper (I), Tehnički vjesnik, 18 (1), 117-124.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Fund manager of the following research projects:

1. "Nove formulacije grafičkih materijala, karakteristike otisaka i čimbenici okoliša" (128-1281955-1953) 2011-2014
2. "Studij materijala i procesa grafičke reprodukcije u funkciji održivog razvoja" (1281955) 2011-2014

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **INTERACTION OF ELECTROMAGNETIC RADIATION WITH PRINTING SUBSTRATE**

Code: **PDS 107**

Semester: I. Semester - fundamental

Teacher: Vesna Džimbeg Malčić, associate professor

Course Summary

Light and the law of energy conservation. Beer-Lambert's system. Kubelka-Munk's system. Murray-Davies' method. Empirical Murray-Davies model of tone reproduction for raster image. Yule-Nielsen correction. Physical analysis of the Yule-Nielsen effect in printing. Modelling the Yule-Nielsen effect by means of probability function. Huntsman's model. The theory of linear systems via function of point spreading (Point Spread Function) that is described in the Fourier field as modulation transfer function MTF (Modulation Transfer Function). MTF analysis of the printing substrate and print. Oittinen-Engeldrum's model. Reflection spectra. Mathematical analysis of the experimental results with Mathcad 2002 programmes, and Data Analysis and Technical Graphics Origin 6.0.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- knowledge and skills necessary to establish connection between the real printing conditions and the physical models describing them, with a constant development of independence and responsibility
- new skills connecting the source of radiation with different surfaces under different conditions, based on the knowledge of physical processes in the interaction of electromagnetic radiation with printing substrate
- ability to design experiments by proposing new conditions in the production of samples of printing substrates
- ability to combine different models based on the real printing conditions
- competence to propose, develop and change the conditions of controlled exposure of samples to electromagnetic radiation, with regard to their optical properties
- skills to analyse the results of the experiment, establishing connection and valuing new insights

Description of teaching methods:

Tutorials (bibliography, define interest area), agreement on measuring (samples, method...)

Compulsory literature:

1. Wyszecki & Stiles: Color Science:Concepts and methods, Quantitative Data and Formulae; Second Edition, John Wiley & Sons, Inc. (2000)
2. H. Kipphan, Handbook of Print Media: Technologies and Production Methods, Springer, Heidelberg, (2001).
3. M. Strlič, J. Kolar: Ageing and stabilisation of paper / edited by Matija Strlič, Jana Kolar. - Ljubljana : National and University Library, 2005

4. R. L. Feller: Accelerated aging : photochemical and thermal aspects, Editor: Dinah Berland, Edwards Bros., Ann Arbor, Michigan, 1994

Additional literature:

1. Nieto-Vesperinas: Scattering and Diffraction in Physical Optics, John Wiley & Sons, Inc. (2001)
2. K. Nassau: The Physics and Chemistry of Color: The Fifteen Causes of Color; Second Edition, John Wiley & Sons, Inc. (2001)

Number of lectures: 30

ECTS: 7

Teaching quality control:

Research paper for a conference or a journal

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Vesna Džimbeg Malčić, associate professor

E-mail: vdzimbeg@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Vesna Džimbeg-Malčić was born in 1956 in Zagreb, where she completed her elementary education and graduated from high school. In 1981, she graduated in Engineering physics and in 1990 she completed her Master's degree, which was a part of her postgraduate studies of natural sciences, programme type: atomic and molecular physics. She completed her doctoral thesis, which was entitled "Application of Kubelka-Munk theory and Yule-Nielsen effect on print substrates", in 2005 at the Faculty of Graphic Arts where she has been working at the Department of Physics in Graphic Technology since 1984. She was appointed to assistant professor position in 2006 and associate professor in 2011. She started her professional work in science at the University's Institute of Physics, Department of atomic and molecular physics where she conducted Spectroscopic research in Electromagnetic radiation. In 1998, she started working on interaction of controlled electromagnetic radiation with selected print substrates, and on the analysis of optical features of absorbent and non-absorbent print substrates. She has been actively participating in a science project which is a part of National Research Program of Ministry of Science and Bilateral Croatian – Slovenian Cooperation Programme in the science and technology discipline. She has been assigned to international science programme COST E32 (European Cooperation in the field of Scientific and engineering research) as well. As a result of her extensive science research, she has published around 40 science papers. 3 (three) of those were published as chapters in science books (serial publications), 5 (five) of them were published with CC or SCI indexes, and 6 (six) were published in secondary publications. She has been an active publisher and a member of international and national science symposiums. Consequently, she has published 17 (seventeen) science papers in International Symposium Records and 10

(ten) of them at National Science Symposiums. She contributed immensely to the modification of curriculum at the Faculty of Graphic Arts, organized two new courses and adjusted curriculum to current undergraduate and graduate studies.

Project associate on the following projects:

- "Istraživanje sustava celuloza, tiskarska boja, tekućina", project manager Zdenka Bolanča, full professor, 2000 - 2002,
- „Mehanizmi deinkinga otisaka digitalnog tiska", project manager Zdenka Bolanča, full professor, 2002 - 2004,
- „Mehanizmi enzimatskog deinkinga digitalnih otisaka i karakteristika otpadnih voda" - bilateral Croatian-Slovenian collaboration program in the field of science and technology, project manager Zdenka Bolanča, full professor, 2003 – 2006,
- „Nove formulacije materijala, karakteristike otisaka i čimbenici okoliša", (128-1281955-1953), project manager Zdenka Bolanča, full professor, 2007,
- „Inovativni grafički materijali", (128-0000000Zdenke Bolanča), project manager Branke Lozo, full professor , 2007
- „Characterisation of paper surfaces for improved printing paper grades" COST Action E32, lecture held in Brasow, Rumunia, 2007: „Control of the print quality through Yule-Nielsen parameter and optical properties of papers"
- „Improvements in the understanding and use of de-inking technology" COST Action E46

In the framework of Cost and Erasmus she participated in international mobility programs at several universities in Europe

From 2008 to 2013 head of the Department of Physics.

From 2009 to 2012 head of the Postgraduate committee.

She is a member of the editorial board of the international journal for printing science and graphic communication "Acta Graphica".

Since 2013/14 she has been Vice dean for Science and International Cooperation.

Date of last academic appointment to the teaching and research position: April 18th 2011

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Itrić, Katarina; Džimbeg-Malčić, Vesna; Modrić, Damir, Optical deterioration of coated wrapping paper. // Acta graphica. 26 (2015) , 1-2; 5-10.
2. Plazonić, Ivana; Barbarić-Mikočević, Željka; Džimbeg-Malčić, Vesna, Optical stability of office papers treated with cocamidopropyl betaine. // Wood Research. 60 (2015) , 2; 263-272
3. Čerepinko, Darijo; Džimbeg-Malčić, Vesna, Pregled tehnologija elektroničkog papira i pretpostavke budućeg razvoja e-papira. // Tehnički glasnik. 7 (2013) , 1; 91-96
4. Barbarić-Mikočević, Ž., Plazonić, I.; Džimbeg-Malčić, V., (2013), The deinkability improvement of offset prints made from a two-side coated substrate, BioResources, 8, 557-570

5. Bates, Irena; Džimbeg-Malčić, Vesna; Itrić, Katarina, Optical deterioration of samples printed with basic Pantone inks. // Acta graphica, Journal for Printing Science and Graphic Communications. 23 (2012) , 3-4; 79-90
6. Džimbeg-Malčić, Vesna; Barbarić-Mikočević, Željka; Itrić, Katarina, Kubelka-Munk Theory in Describing Optical Properties of Paper (II). // Tehnicki Vjesnik-Technical Gazette. 19 (2012) , 1; 191-196
7. Plazonić, Ivana; Dzimbeg-Malčić, Vesna; Barbarić-Mikočević, Željka, A Novel Eco-Alkali Chemistry in Newspaper Flotation Deinking. // Acta graphica. 23 (2012) ; 91-98
8. Džimbeg-Malčić, Vesna; Barbarić-Mikočević, Željka; Itrić, Katarina, Kubelka-Munk Theory in Describing Optical Properties of Paper (I). // Tehnički -Technical Gazette. 18 (2011) , 1; 117-124

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Research associate in the projects financed by the University of Zagreb:

1. Slama pšenoraži kao izvor vlakanaca u proizvodnji novinskog papira, ac. year 2013/2014,
2. Slama žitarica kao izvor primarnih vlakanaca u proizvodnji novinskog papira, ac. year 2014/2015
3. Utjecaj ne-drvnih vlakanaca na kemijsku stabilnost grafičkog proizvoda, ac. year 2015/2016.

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **MODERN STATISTICAL METHODS IN NATURAL SCIENCES AND ENGINEERING**

Code: **PDS 108**

Semester: I. Semester - basic

Teacher: Aleš Hladnik, associate professor

Course Summary

Extension of statistical way of thinking and approach to research and experimentation. Students become familiar with modern statistical methods they will use at their R&D or professional work. Emphasis is on understanding the basic ideas of the presented techniques and on solving real-world engineering problems by means of statistical software.

- Characteristics of research work in natural sciences and engineering
- Statistical software (web resources, StatGraphics, Statistica, Excel, MATLAB)
- Overview of basic statistics (sample and population, data, variables, descriptive and inferential statistics, normal distribution, hypothesis testing, univariate and multivariate statistics, one-way analysis of variance (ANOVA), linear correlation and regression)
- Multivariate methods (principal components analysis, cluster analysis, multifactorial ANOVA, overview of other methods: factor analysis, multiple linear regression, discriminant analysis, multidimensional scaling, correspondence analysis)
- Design and analysis of experiments (factorial designs, factors and their interactions, response surfaces, optimization methods)

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- skills to create and evaluate new facts, concepts, procedures, principles and theories in the field of scientific research
- advanced, complex, original, highly specialized knowledge, skills, activities and procedures necessary for the acquisition of new knowledge and new methods
- ability to integrate different area
- scientific independence, personal professional and ethical authority
- ability to manage scientific and research activities
- commitment to the development of new ideas and processes

Description of teaching methods:

Block lectures, tutorials

Compulsory literature:

1. Montgomery, DC, Runger GC (2003), Applied Statistics and Probability for Engineers, 3rd ed., J. Wiley&Sons

2. Lane DM et al. (2013), Online Statistics: An Interactive Multimedia Course of Study. WEB: http://onlinestatbook.com/ [datum pristupa sadržaju: 3.3.2016]
3. StatSoft, Inc. (2016), Electronic Statistics Textbook. Tulsa, OK: StatSoft. WEB: http://www.statsoft.com/textbook/ [datum pristupa sadržaju: 3.3.2016]

Additional literature:

1. Massart, DL, Vandeginste, BGM, Deming, SN, Michote, Y, Kaufman, L (1988), Chemometrics: A Textbook, Elsevier
2. Hair, JF, Anderson, RE, Tatham, RL, Black, WC (1998), Multivariate Data Analysis, 5th ed., Prentice-Hall International
3. Morgan, E (1991), Chemometrics: Experimental Design, J. Wiley & Sons, New York

Number of lectures: 20

ECTS: 5

Teaching quality control:

Seminar paper made by each student, oral exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Aleš Hladnik, associate professor
E-mail: ales.hladnik@ntf.uni-lj.si
Work Institution: University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Graphic Arts and Design, Chair of Information and Graphic Technology

Short CV:

Dr. Aleš Hladnik is currently an Associate Professor at the Chair of Information and Graphic Technology, Faculty of Natural Science and Engineering, University of Ljubljana. He received his B.Sc. in Chemistry from University of Ljubljana, Slovenia in 1994 and Ph.D. in Technical Sciences from University of Graz, Austria in 2003. His main research interests are paper and print quality assessment, implementation of statistical and computer supported methods in graphic arts, papermaking and material science (linear regression, ANOVA, PCA, cluster analysis, experimental design, artificial neural networks), image processing and –analysis, and colour science. His bibliography consists of over 230 bibliographical records. He published 46 original scientific articles, 31 of which are (S)SCI publications, and had 60 scientific and professional contributions at national and international conferences.

He was a coordinator or a member of several Slovenian basic and applied projects and a manager of two bilateral projects with Croatia and one with Serbia. He was also a member of two COST Actions. He holds several B.Sc. and

M.Sc. courses at the Faculty of Natural Science and Engineering, University of Ljubljana and one Ph.D. course at the Faculty of Graphic Arts, University of Zagreb, Croatia. 52 undergraduate – diploma and master – theses were conducted under his supervision or co-supervision. His full bibliography (1994-2015) is available here: http://splet02.izum.si/cobiss/bibliography?code=15846&langbib=eng&li=en

Date of last academic appointment to the teaching and research position: November 20th 2014

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. GABRIJELČIČ TOMC, H, HLADNIK, A (2015), 1D and 2D shape descriptors applied in fabric drape computer simulation, Fibres and Textiles in Eastern Europe, 23(6), 92-101.
2. MAJNARIĆ, I, HLADNIK, A, MUCK, T, BOLANČA-MIRKOVIĆ, I (2015), The influence of ink concentration and layer thickness on yellow colour reproduction in liquid electrophotography toner, Technical Gazette, 22(1), 145-149.
3. MODRIĆ, D, PETRIC MARETIĆ, K, HLADNIK, A (2014), Determination of point spread function of paper substrate based on light scattering simulation, Applied Optics, 53(33), 7854-7862.
4. ĐOKIĆ, M, RADONIĆ, V, MLADENOVIČ, V, PLETERŠEK, A, KAVČIČ, U, HLADNIK, A, CRNOJEVIĆ-BENGIN, V, MUCK, T (2014), The influence of lamination and conductive printing inks on smart-card operability, Materials and Technology, 48(4), 497-504.
5. JAVORŠEK, D, JERMAN, T, RAT, B, HLADNIK, A (2014), Assessing the performance of a spectral reflectance estimation method based on a diffraction grating and a spectroradiometer, Coloration Technology, 130(4), 288-295.
6. GOLEŽ, M, HLADNIK, A (2013), Interpreting the age of the ruins of St. John the Baptist's church with multivariate analysis, Journal of Cultural Heritage, 14(4), 354-358.
7. KARLOVITS, M, HLADNIK, A, ČERNE, L, GREGOR-SVETEC, D (2013), Use of effect pigments for quality enhancement of offset printed specialty papers, Color Research & Application, 38(3), 168-176.
8. PAVKO-ČUDEN, A, HLADNIK, A, SLUGA, F (2013), Loop length of plain single weft knitted structure with elastane, Journal of Engineered Fibers and Fabrics, 8(2), 110-120.
9. PAVKO-ČUDEN, A, HLADNIK, A, SLUGA, F (2013), Impact of material, structure and relaxation process parameters of elasticized single-knitted fabrics on loop length, Textile Research Journal, 83(1), 56-65.
10. MODRIĆ, D, PETRIC MARETIĆ, K, HLADNIK, A (2012), Modeling spatial reflection from an uncoated printing paper using Monte Carlo simulation, Nordic Pulp and Paper Research Journal, 27(5), 968-975.
11. HLADNIK, A, MUCK, T, STANIĆ, M, ČERNIČ, M (2012), Fast Fourier transform in papermaking and printing: two application examples, Acta Polytechnica Hungarica, 9(5), 155-166.
12. PAVLOVIĆ, Ž, MUCK, T, HLADNIK, A, KARLOVIĆ, I (2012), A comparative study of offset plate quality parameters using image processing and analytical methods, Acta Polytechnica Hungarica, 9(6), 181-193.
13. KÖNIG, S, GREGOR-SVETEC, D, HLADNIK, A, MUCK, T (2012), Assessing the lightfastness of prints by image chrominance histogram quantification, Journal of Imaging Science and Technology, 56(6), 060507/1-060507/7.

14. ZUPIN, Ž, HLADNIK, A, DIMITROVSKI, K (2012), Prediction of one-layer woven fabrics air permeability using porosity parameters, Textile Research Journal, 82(2), 117-128.
15. HLADNIK, A, LAZAR, M (2011), Paper and board surface roughness characterization using laser profilometry and gray level cooccurrence matrix, Nordic Pulp and Paper Research Journal, 26(1), 99-105.
16. JAVORŠEK, D, JAVORŠEK, A, HLADNIK, A (2010), Comparison of chromatic adaptation transforms used in textile printing sample preparation, Coloration Technology, 126(5), 275-281.
17. DEBELJAK, M, BRAČKO, S, HLADNIK, A, GREGOR-SVETEC, D (2010), Comparison of ultraviolet inkjet printing on different synthetic fibrous papers, Tappi Journal, 9(5), 17-25.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. New possibilities for print media and packaging - combining print with digital (COST Action FP1104; Management Committee substitute; 2012 – 2016)
2. Textiles and Ecology (national research program, 2009 – 2019)
3. 3D and 4D microscopy: development of new powerful tools in geosciences (National basic research project, 2016 – 2018)
4. Development of novel bio-resistant and stain-free stone surfaces (National applied research project, 2013 – 2016)
5. Introduction of alternative crops with high content of polyunsaturated fatty acids in the crop rotation, functional use of seeds, oil and secondary products in Slovenia (National target research project, 2011 – 2014)

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0; 4 current PhD students

Course

Name of Course: **ADVANCED IMAGING TECHNOLOGIES FOR PRINTING PLATES**

Code: **PDS 109**

Semester: I. Semester - fundamental

Teacher: Sanja Mahović Poljaček, associate professor

Course Summary

Redefinition of printing forms as the information record carrier; material and virtual printing forms; digital records of information on printing forms; dynamic printing forms; CTP and CTS systems; system architecture; laser and other sources of energy for generating images; interaction of the emitted energy with the surface; physical, physical-chemical and electrochemical processes in image generating; ablational and non-ablational processes; thermal processes; electrocoagulation; electrostatic processes, selectively sensitive layers, semiconductors and organic photoconductors; systems with no processes; relation between resolution and printing speed; different CTP configurations; analysis of functional characteristics of unconventional printing forms; surface topography and geometry on printing forms; comparative analysis of conventional, CTP and virtual printing forms.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- skills to create and evaluate new insights regarding the development of digital printing plates, concepts, production methods, principles and theories in the field of scientific research
- advanced, complex and topical knowledge and skills in the field of printing plates and graphic technologies
- knowledge about new methods for integration of different processes

Description of teaching methods:

Lectures

Compulsory literature:

1. Adams, R. M.; Romano, F. (2001), Computer to Plate: Automating the Printing Industry, Pittsburg: Graphic Arts Technical Foundation
2. Cusdin, G. (1999), Flexography: Principles & Practices. 5th ed. Vol. 1., NY: Foundation of Flexographic Technical Association
3. Crouch, J.P. (2005), Flexography Primer. 2nd edition, Pittsburgh: PIA/GATF Press
4. Kipphan, H. (2001), Handbook of Print Media, Heidelberg: Springer-Verlag Berlin
5. Brett, G., (2001), Virtual formes Management & Technology, GB: Pira, Leatherhead
6. Geimenhardt, J., (2001), CTP-Belichter und Platten Technologie, Fachhefte-Bulletin Technique 4, 14-17
7. Mahović, S., (2004), Utjecaj različitih ofsetnih tiskovnih formi na kakvoću grafičke reprodukcije, Master's thesis, University of Zagreb Faculty of Graphic Arts
8. Brajnović, O., (2011), "Prilagodba izrade fotopolimerne tiskovne forme novim kvalitativnim zahtjevima, Master's thesis, University of Zagreb Faculty of Graphic Arts

Additional literature:

1. Seydel M., (1996), Computer to Plate: Digital Workflow and Integration into Quality Offset Printing, TAGA Proceedings, Rochester, NY, 634-348.
2. Mahović Poljaček, S., Risović, D., Furić, K., Gojo, M., (2008),
3. Comparison of fractal and profilometric methods for surface topography characterization, Applied Surface Science 254, 11; 3449-3458.
4. Hoffmann-Walbeck, T., Riegel, S., Tuchel, B., Mahović Poljaček, S., Cigula, T., Tomašegović, T., (2015),
5. Quality Assurance of Process Free Thermal Plates, Acta graphica 26, 3; 31-37.
6. Mahović Poljaček, S., Tomašegović, T., Cigula, T., Gojo, M., Milčić, D., (2014) Formation of the Printing Elements in the Photopolymer Material Used in Flexography, Key Engineering Materials. 611-612; 883-891.

Number of lectures: 25

ECTS: 6

Teaching quality control:

At the end of the lecture and following tutorial with the teacher students select a topic from the contents of lectures that they have found particularly interesting. They analyse it and present it in writing and orally. They plan experimental work, research methodology and data processing (if the chosen topic allows) and finally, publishing a joint scientific paper at a conference or a journal.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Sanja Mahović Poljaček, associate professor

E-mail: smahovic@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Associate Professor Sanja Mahović Poljaček, MSc PhD was born on 15 December 1974 in Zagreb. She completed her elementary education in Samobor and graduated from the 5th Grammar high school in Zagreb. In 1993 she started her studies in Graphic arts at the University of Zagreb, programme type: graphic product design and graduated in 1998.

As a student she was awarded a scholarship by the Ministry of science and education based on her grade point average.

From 1996 to 2001 she worked as a graphic designer at the company called "Sant" and in the visual communication studio "Graffiti Design". In 2001, she was appointed junior assistant at the Faculty of graphic arts, University of Zagreb, first at the Department of Reproduction Photography, but later at the Department of Printing forms, where she is currently working. She started her postgraduate study in graphic technology at the

Faculty of Graphic Arts and completed her Master's Degree, which was entitled ''Influence of different offset printing forms on graphic reproduction quality" on 13 February 2004. In 2006, she was awarded a scholarship by the Ministry of science, education and sports, which included student traveling arrangements and postgraduate training programme at Forga Institute in Munich. She completed her doctoral thesis, entitled "Surface properties categorization of offset printing forms" on 25. May 2007 at the Faculty of Graphic Arts University of Zagreb. She has been a research associate on many science projects supported by MZOŠ (Ministry of science, education and sports), such as, project code: 128-1201785-2228 New Approach to the Printing Forms Microsurface Characterisation, project code: 128-1281957-1958 "Digitalization of museum art heritage" (since 2007) and a bilateral project with Slovenia 'Electrochemical testing and corrosion resistance of aluminium and its oxides and application in print form for planographic printing" since 2010. In 2010 she was awarded a scholarship, which was a part of EU Lifelong Learning Programme for university staff training, founded by the Faculty of chemistry and chemical engineering in Maribor, Slovenia. In 2013, she was awarded the same scholarship for professional training in Spain, Madrid, at the'' Facultad de Informática de la Universidad Complutense de Madrid". She was appointed to the research fellow position on 1 March 2011 and to associate professor position on 20 May 2013.

Date of last academic appointment to the teaching and research position: May 20th 2013

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Faculty books:

1. Gojo, M.; Mahović Poljaček, S., (2013), Osnove tiskovnih formi, Zagreb: University of Zagreb Faculty of Graphic Arts

Book chapters:

2. Urbas, R.; Stankovič Elesini, U.; Cigula, T.; Mahović Poljaček, S., (2016),
3. Printing on Polymers Fundamentals and Applications - Pad printing, Oxford: Elsevier

Papers in journals:

4. Tomašegović, T.; Mahović Poljaček, S.; Leskovac, M., (2016), UVA and UVC modification of photo polymeric surface and application for flexographic deposition of thin coatings, Journal of applied polymer science
5. Tomašegović, T.; Beynon, D.; Claypole, T.; Mahović Poljaček, S., (2016), Tailoring the properties of deposited thin coating and print features in flexography by application of UV-ozone treatment, Journal of coatings technology and research
6. Hoffmann-Walbeck, T.; Riegel, S.; Tuchel, B.; Mahović Poljaček, S.; Cigula, T.; Tomašegović, T., (2015), Quality Assurance of Process Free Thermal Plates, Acta graphica. 26, 3; 31-37.
7. Mahović Poljaček, S.; Tomašegović, T.; Cigula, T.; Gojo, M.; Milčić, D. (2014), Formation of the Printing Elements in the Photopolymer Material Used in Flexography, Key Engineering Materials, 611-612, 883-891.

8. Poljak, J.; Botella, G.; García, C.; Mahović Poljaček, S.; Matías, Manuel P.; Tirado, F., (2013), Offset Printing Plate Quality Sensor on a Low-Cost Processor, Sensors. 13, 14277-14300.
9. Tomašegović, T.; Mahović Poljaček, S.; Cigula, T., (2013), Impact of Screen Ruling on the Formation of the Printing Elements on the Flexographic Printing Plate, Acta graphica, 24; 1-12.
10. Tomašegović, T.; Mahović Poljaček, S.; Cigula, T., (2013), Surface properties of flexographic printing plates related to UVC post-treatment, Journal of Print and Media Technology Research, 2, 4; 227-233.
11. Mahović Poljaček, S.; Risović, D.; Cigula, T.; Gojo, M., (2012), Application of electrochemical impedance spectroscopy in characterization of structural changes of printing plates, Journal of solid state electrochemistry. 16, 3; 1077-1089.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Project manager:

1. Scientific bilateral German-Croatian project "Quality insurance of processless printing plates" 2014- 2015
2. Research support program of the Ministry of Science, Education and Sports , TP082 (2015)
3. Research support program of the Ministry of Science, Education and Sports, TP1.73 (2014)

Research project associate on the following projects:

4. "Razvoj metoda mjerenja površina tiskovnih formi", 128-1201785-2228, Ministry of Science, Education and Sports, 2007-2014
5. Digitalizacija muzejske slikarske baštine, br. 128-1281957-1958, Ministry of Science, Education and Sports (2007-2014)
6. "Elektrokemijska ispitivanja i korozijska otpornost aluminija i njegovih oksida i primjena na tiskovnoj formi za plošni tisak", Ministry of Science, Education and Sports, bilateral Slovenian-Croatian project, 2010-2011
7. "Razvoj sustava ekološki prihvatljivijih modela pakiranja", University of Zagreb, 2014

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0; 1

Course

Name of Course: **PRESENTATION OF INFORMATION**

Code: **PDS 111**

Semester: I. Semester - fundamental

Teacher: Nikola Mrvac, full professor

Course Summary

The course content is based on principles that are used to define the strategy of presenting information. The course programme includes defining the problem, establishing the connection between the consumer and information presenter, creating the need for accepting information, defining competencies, creating optimum conditions for presenting, methods for accepting the presenter, methods for collecting and analysing information. Categorisation and ways of presenting different informative contents. Techniques and tools of making a multimedia presentation. Formatting text, image, video and audio contents in a multimedia presentation. New approaches to information presentation. Planning and giving a presentation.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- competencies related to the presentation of different types of information with an emphasis on graphic information
- capacity to take into account all relevant parameters that influence the strategy and practical delivery of the presentation.
- advanced knowledge in the field of the course
- specialized skills and techniques necessary for critical problem solving by means of innovative approaches
- independence, scientific and professional integrity

Description of teaching methods:

Tutorials, seminar paper, presentations

Compulsory literature:

1. Carter M., (2013), Designing Science Presentations: A Visual Guide to Figures, Papers, Slides, Posters, and More, San Diego, USA, ELSEVIER
2. Alley M., (2013) The Craft of Scientific Presentations: Critical Steps to Succeed and Critical Errors to Avoid, Second Edition, Pennsylvania, USA, Springer

Additional literature:

1. (2010 – 2015) proceedings of the International Conference on Printing, Design and Graphic Communications "Blaž Baromić" 12-19
2. (2010 – 2015) proceedings of the International Conference "PRINTING & DESIGN, FS, Fotosoft

Number of lectures: 30

ECTS: 7

Teaching quality control:

Evaluation of the seminar paper, presentation of the seminar paper, evaluation of the presentation and competencies gained during activities related to the content of the module.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Nikola Mrvac, full professor

E-mail: nikola.mrvac@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Professor Nikola Mrvac, PhD was born on 28 May 1969. in Desni Srediček. He graduated from the Vocational school of graphic arts in Zagreb and later, in1994, from the Faculty of Graphic Arts in Zagreb. In 2001 he defended his Master's thesis entitled ''Typography development in multimedia society'', at the Faculty of Organization and Informatics in Varaždin. In 2003 he defended his doctoral thesis entitled ''Synthesis of interactions of selected graphic reproduction parameters" and was awarded a PhD degree in the field of graphic technology. After his studies he worked as a graphic arts teacher at the Graphics School in Zagreb in 1994, but in the same year he started working at the Faculty of Graphic Arts in Zagreb, Department of Printing, where he has been a full-time professor ever since. As a research associate and project manager he has been appointed to the following projects, which are an integral part of the National Science Research Programme of the Ministry of science and technology: 1999.- 2002 "Influence of printing techniques and graphic materials on paper recycling efficiency", 2002 -2006 "Specification of paper features and formulations for digital printing and its recycling" 2007 - "A study of technological factors in graphic design for systematic quality improvement" as an associate in 2007. - „Evaluation of quantitative and qualitative graphic reproduction process criteria" as project manager. In 2012, he was appointed research fellow and in 2013 a full-time professor. The quality of his teaching is best demonstrated by his numerous memberships and engagement in faculty teaching boards and associations. (Committee for e-learning strategies, University of Zagreb, Committee for e-learning, Committee for learning and graduate exams at the University of Zagreb). He won the annual award of The society of university teachers, scholars and other scientists for the 2000/2001 academic year in the field of graphic technology, engineering sciences. He contributed greatly to creation of a new study programme which was consistent with Bologna regulations. The study programme of Graphic technology university study at the Faculty of Graphic Arts in Zagreb was based on the programme draft proposition written by Nikola. Furthermore, he is one of the co-authors of vocational study programme ''Multimedia, design and application'' of Vocational studies in Varaždin. The same programme was accepted by the Faculty of Graphic Arts in Kiseljak, University of Travnik. He cooperated with both institutions for the purposes of higher educational system improvement and study

programme adjustment to the up-to-date programme propositions. On the national level, he has been a member of National Council for Curriculum and Assessment and Technology and Informatics Working group. He is included in major decisions on study programs as well as document drafting for the purposes of successful programme delivery. He is the chair of Vocational Education Council and the author of methodology of EVALUS system and EVA software (skill management and evaluation systems). Furthermore, his work activities have been actively promoting work and education in graphics. Until now he has published around 80 research papers (chapters, science journals, collection of papers, and so on).

Date of last academic appointment to the teaching and research position: February 12th 2013

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Vusić, Damir; Mrvac, Nikola; Milković, Marin; The neon colour spreading effect in various surround ambient conditions. // Tehnički vjesnik. 18 (2011) , 2(2011); 219-225
2. Milković, Marin; Mrvac, Nikola; Vusić, Damir; Evaluation of the chromatic adaptation effect intensity by "tuning" the desaturated achromatic reproductions printed in the offset. // Tehnički vjesnik. 18 (2011) , 4; 519-528
3. Vusić, Damir; Milković, Marin; Mrvac, Nikola; The Influence of the Primary Color Stimuli Selection on the Neon Color Spreading. // TTEM - Technics Technologies Education Management. 7 (2012) , 1; 81-87
4. Tomiša, Mario; Mrvac, Nikola; Milković, Marin; Determination of Graphic Design Qualitative Criteria. // TTEM - Technics Technologies Education Management. 7 (2012.) , 1; 49-56
5. Milković, Marin; Mrvac, Nikola; Zjakić, Igor; Comparative Analysis of the Intensity of the Induction and Assimilation Effects of the Equivalent Geometric Structures of Graphic Reproductions. // TTEM - Technics Technologies Education Management. Volume 7 (2012) , Nuber 2; 49-56
6. Milković Marin; Matijević Mile; Mrvac Nikola, Intensity evaluation of the spreading and simultaneous contrast effects based on the dotted White's samples. // Tehnički vjesnik, vol. 19 (2012) , 3; 521-529
7. Milković, Marin; Mrvac, Nikola; Matijević, Mile, Evaluation of the effect of retinal localized chromatic adaptation intensity on desaturated achromatic reproductions derived by standard rendering methods. // Colour research and application. 38 (2013) , 4; 277-283
8. Matijević, Mile; Mrvac, Nikola; Mikota, Miroslav, The Effect of Expansion and Simultaneous Contrast in Modificated Figural Dotted and Groundal Dotted Illusions. // Tehnički vjesnik, vol. 21 (2014) , 6; 1297-1301
9. Čerepinko, Darijo; Mrvac, Nikola; Milković, Marin, Determination of Visual Interest Points of Graphical User Interfaces for Tablet Newspapers Application. // Tehnički vjesnik, vol. 22 (2015) , 3; 659-665
10. Budimir, Ivan; Mrvac, Nikola; Matijević, Mile, The influence of the thickness of the grid in Munker-White effect. // Tehnički vjesnik. 22 (2015) , 2; 425-430

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

National scientific and research program of the Ministry of Science, Education and Sports

Project manager

1. 2007 – 2013 „Evaluacija kvantitativnih i kvalitativnih kriterija procesa grafičke reprodukcije“, Code: 128-1281955-1960

   Researcher
2. 2007- 2013 "Studij tehnoloških čimbenika grafičkog dizajna za sustavno unapređenje kvalitete" Code:128-1281955-1962, key researcher full professor Stanislav Bolanča
3. “Standardizacija grafičkih prikaza u multimedijskom okruženju”, University of Zagreb – research support program 2015 – project manager

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 6

Course

Name of Course: **MULTIMEDIA SYSTEMS**

Code: **PDS 112**

Semester: I. Semester - fundamental

Teacher: Karolj Skala, full professor

Course Summary

Communication theory, digitization technology, data processing and storage.
Monomedia techniques, media convergence, integration of media, multimedia techniques.
Multimedia information processing, multimedia and hypermedia communications.
Application of computers in processing communication and methods of creating knowledge from data.
Multidimensional interface, intelligent and adaptable interface.
Connecting interface with databases.
Data mining, visual mining.
Theory of virtual reality and augmented reality, agents and avatars.
Web portals and protocols.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- introduction into the theory and practice of multimedia communications
- skills to use modern tools and methods, integrate multimedia systems and apply them practically in modern communications
- fundamental skills in designing and developing solutions by means of modern computer and communication technologies
- knowledge of network communication techniques and technologies
- introduction into the tools and skills of application networking services
- ability to identify and solve problems of contemporary communication channels using multimedia technologies
- skills to develop problem-solving skills employing modern scientific multimedia communication creativity, problem solving, cooperation, and communication
- advanced competence in communication using modern ICT technologies
- new knowledge, methods, skills, techniques and tools in business practice
- insight into the application of contemporary hypermedia communication by means of multimedia techniques
- independence and team work in preparing multimedia presentations
- familiarization with communication management in business environment and in the course of the implementation of scientific projects

Description of teaching methods:

Active participation. Oral presentation. Teaching materials are accompanied by a PPT presentation. Illustrations by means of web content, animations and video demonstrations. Discussion and analysis through tasks and questions. Seminar papers and discussion. Exercises with examples and practical work.

Compulsory literature:

1. Skala, K., 2003., Optoelektronički sustavi, Zagreb, 2003 (pogl. 1, 2, 6,)
2. Meinel, Christoph, Sack, Harald, Digital Communication,. Springer Book, 2014
3. Web materijali, Multimedijski referalni centar, URL: www.carnet.hr/obrazovni/referalni/imme

Additional literature:

1. Andrew White, Designing Web Interfaces, Hypertext and Multimedia, Prentice Hall.
2. Alberto Del Bimbo, Visual Information Retrieval, Morgan Kaufmann Publisher.
3. Andrew White, Designing Web Interfaces, Hypertext and Multimedia, Prentice Hall

Number of lectures: 25

ECTS: 6

Teaching quality control:

Seminar paper, oral exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Karolj Skala, full professor

E-mail: skala@irb.hr

Work Institution: Ruđer Bošković Institut, Zagreb

Short CV:

Karolj Skala was born on 21 January in Subotica. He graduated in 1974 at the programme type Electrical engineering, and earned his Master's degree in 1979 under the topic of „Transfer of digital data by semiconductor laser". He defended his doctoral thesis „Analysis of reflection detectability in wide angle non-coherent optical illumination" at the Faculty of electrical engineering and computer science in 1983.

Prof. Karolj Skala, PhD, tenured fellow (2005) at the Ruđer Bošković Institute in Zagreb, holds the position of Head of Centre for Informatics and Computer Science. At the University of Zagreb je is a full professor, tenured, and he teaches at the following courses: Optoelectronic systems, Digital multimedia and Multimedia communication, Programming logical systems. He is also project manager of several national scientific and technological projects. He initiated the CRO GRID national programme which generated the CRO NGI. He has

participated in the EU projects COST 254, COST 276 i COST IC 0805 from Croatia. He successfully completed five EU FP 6, and seven EU FP7 projects. He was project manager of many development projects in the area of purpose optoelectronic and laser devices. These projectes resulted in production and income in the international market. He founded the eScience technology in Croatia and he has been working on eInfrastructural connection with European Research Area. He has started several eScience scientific services. He has initiated the development of scientific Cloud computing scientific infrastructures and has equipped a visualisation laboratory with EU funds.

So far, his scientific-research work includes: 72 research papers, 42 professional papers, one published book in co-authorship, three seminar textbooks, one university textbook and edition of 18 research papers proceedings, and he has also supervised 25 graduate papers. He has been a member of the Croatian Academy of Engineering and adjunct member of Hungarian Academy of Science.

Date of last academic appointment to the teaching and research position: 2014

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Davor Davidovic, Matjaz Depolli, Tomislav Lipic, Karolj Skala, Roman Trobec, Energy Efficiency of Parallel Multicore Programs, Scalable Computing: Practice and Experience , Vol 16 No4, 2015
2. Karolj Skala, at al, Scalable Distributed Computing Hierarchy: Cloud, Fog and Dew Computing, Open Journal of Cloud Computing, Vol 2, No 1, 2015.
3. Karolj Skala, Davor Davidović, Tomislav Lipić, Ivan Sović, G-Phenomena as a Base of Scalable Distributed Computing (G-Phenomena in Moore's Law), International Journal of Internet and Distributed Systems, V2, No1 PP. 1-4 DOI: 10.4236/ijids.
4. Skala, Tibor; Todorovac, Mirsad; Skala, Karolj, Distributed reliable rendering method for parametric modeling. Journal of, Circuits Systems and Computers 22 (2013) , 2; 1-19
5. Skala Karolj, Lipić, Tomislav; Sović, Ivan; Grubišić, Ivan; Grbeša, Igor, Toward 3D Thermal Models Standardisation for Human Body in Motion, Quantitative InfraRed Thermography Journal. Vol. 11, No 2, 2013
6. Skala, Tibor; Skala, Karolj, Afgan Enis Impact of 3D Graphic Structure Complexity to the Rendering Time, Journal of, Circuits Systems and Computers 22 (2013) , 8; 12-21
7. Lučić, Bono; Sović, Ivan; Batista, Jadranko; Skala, Karolj; Plavšić, Dejan; Vikić-Topić, Dražen; Bešlo, Drago; Nikolić, Sonja; Trinajstić, Nenad, The Sum-Connectivity Index - An Additive Variant of the Randić Connectivity Index. // Current computer-aided drug design. 9 (2013) ; 184-194
8. Afgan, Enis; Bangalore, P.; Skala, Karolj., Application Information Services for Distributed Computing Environments. Future generation computer systems. 27 (2010) , 2; 173-181
9. Skala, Karolj; Lipic, Tomislav; Sovic, Ivan; Gjenero, Luko; Grubisic, Ivan, 4D Thermal Imaging System for Medical Applications. Periodicum biologorum. 113 (2011) , 4; 407-416
10. Skala, Karolj; Lipić, Tomislav; Sović, Ivan; Gjenero, Luko; Grubišić, Ivan. 4D Thermal Imaging System for Medical Applications. // Periodicum biologorum. 113 (2011) , 4; 407-416

11. Sović, Ivan; Lipić, Tomislav; Gjenero, Luko; Ivan Grubišić; Skala, Karolj, Experimental verification of heat source parameter stimation from 3D thermograms. // Periodicum biologorum. 113 (2011) , 4; 417-423
12. Davidovic Davor; Skala, Karolj; Belusic, Danijel; Telisman-Prtenjak, Maja. Grid implementation of the Weather Research and Forecasting model. Earth Science Informatics. 3 (2010) , 4; 199-208
13. Medved Rogina, Branka; Skoda, Peter; Skala, Karolj; Michieli, Ivan. Metastability Testing at FPGA Circuit Design using Propagation Time Characterization. Radioelectronics & Informatics Journal. 51 (2010) ,4; 4-8

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. SEE GRID SCI - SEE-GRID eInfrastructure for regional eScience, EU FP7, 2008-2010
2. DARIAH - Digital Research Infrastructure for Arts and Humanities, EU FP7, 2008-2010
3. EGEE-II - Enabling Grids for E-science-II, EU FP6, 2006-2008
4. EGEE-III - Enabling Grids for E-science-III, EU FP7, 2008-2010
5. COST # 0805, Open European Network for High Performance Computing on Complex Environments, 2010-2013
6. AIS DC Application Information Services for Distributed Computing Environments Acronym, EU FP7, 2011-2013
7. SCI BUS eScience infrastructure for storm and waterspout prediction in the Adriatic sea EU FP7 2012-2014
8. E2LP, Embedded Computer Engineering Learning Platform, EU FP7, 2012-2015
9. INDIGO DATA CLOUD Integrating Distributed data Infrastructures for Global Exploitation , Horizon 2020, 2015-2018,
10. EGI ENGANGE European Grid Initiative Vision of the Open Science Commons, Horizon 2020, 2015-2018,
11. SESAME NET Supercomputing Expertise for Small and Medium Enterprise Network, Horizon 2020, 2015-2018.

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 4

Course

Name of Course: **COMPUTER TYPOGRAPHY**

Code: **PDS 113**

Semester: I. Semester - fundamental

Teacher: Ivana Žiljak Stanimirović, associate professor

Course Summary

Classification of typography methods, procedures, programs and program tools. Integration of text and image. Languages and standards in computer typography. Format standards of font entries, code systems and code pages. Definition of characters in bit map vector, and in pixel. Tools and programs for character shaping, paring, hinting. Bézier method. Transformation and morphology in typography. Vectorisation of pixel entries. Methods of optical reading and icon recognition. Aesthetic programs, systems of thickness values of characters, word division program. Program tools of formatting book, offset and newspaper page. Printing graphic machines dependent RIP techniques. Typography specifics depending on display technique and printing: screen display, digital printing, offset coating, microprint. Separation of spot and process colors of characters. Trapping. Typography programming in PostScript. Supplements programmaing for PageMaker and QuarkXpress with application in newspaper page layout. Line graphics. 2D, 3D, continual between-icon transfers. Animation typography.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- advanced knowledge in the field of computer typography
- specific competencies, specialized knowledge, skills and techniques for innovative approaches to problem solving
- advanced knowledge in the area of typography design, to be applied in the field of professional, scientific, research and innovation activities

Description of teaching methods:

research

Compulsory literature:

1. I. Žiljak, K. Pap, J. Žiljak Vujić: "Infrared Design", FS, Zagreb, (2008), ISBN 978-953-7064-09-9 , znanstvena knjiga, međunarodna recenzija.
2. I. Žiljak, K. Pap, J. Žiljak Vujić: "Infrared Security Graphics", FotoSoft, Zagreb, (2009), ISBN 978-953-7064-11-2 znanstvena knjiga, međunarodna recenzija

Additional literature:

1. 2011. – 2015) Zbornici radova, 12-19. međunarodne konferencije tiskarstva, dizajna i grafičkih komunikacija Blaž Baromić, Hrvatsko društvo grafičara
3. (2011. – 2015) Zbornici radova međunarodnih znanstvenih skupova TISKARSTVO & DIZAJN, FS, Fotosoft,

Number of lectures: 30

ECTS: 7

Teaching quality control:

Publication of paper

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Ivana Žiljak Stanimirović, associate professor

E-mail: ivana.ziljak.stanimirovic@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Ivana Žiljak Stanimirović, PhD, Assistant Professor at the Faculty of Graphic Arts in Zagreb, was born in 1978 in Zagreb. She finished elementary school and high school in Zagreb, and in 1996 she enrolled in the Design School at the Faculty of Architecture in Zagreb. She graduated in January 2001.

Since 2001 she has worked as a research fellow at the Faculty of Graphic Arts, where she participated in scientific work and instruction. In 2002 she enrolled in the postgraduate studies at the Faculty of Graphic Arts in Zagreb. In 2005 she defended her Master's thesis in engineering sciences, field of graphic technology , titled „Graphics of documents with spot colours from the ultraviolet area" at the Faculty of Graphic Arts in Zagreb, supervised by Darko Agić, PhD.

In 2007 she defended her doctoral dissertation titled „Designing security graphics with variable colours of digital printing in the visible and invisible part of the spectrum" at the Faculty of Graphic Arts, University of Zagreb, supervised by Darko Agić, PhD.

In 2009 she was appointed research associate in the scientific discipline of engineering sciences, field of graphic technology.

She was appointed assistant professor in 2009, and senior research associate in 2010.

In 2010 she was awarded the National Award for Science and the Award for Excellence in Science of the Ministry of science, education and sports o the Republic of Croatia.

Ivana and her associates received 60 prestigious awards for discoveries in the area od security graphics design and INFRAREDESIGN, in Croatia and abroad, from the USA to Malaysia.

The areas of work of Ivane Žiljak Stanimirović, PhD, include the theoretical and practical improvement of design and printing technology with emphasis on security and security graphics using ultraviolet and infrared colours, micro-lenses and holography. She is working in the area of typography and individualized grating elements. Her latest findings are related to programming visible and invisible security codes with multimedia application.

She has been a professional member of the Croatian Designers Society since 2000.

She has applied her scientific findings in many graphic solutions. She has presented her work at 20 selected international group exhibitions in Croatia and abroad. She has held 10 solo exhibitions, the most significant being the INFRAREDESIGN exhibitions in Croatia and abroad.

Together with her associates she has written three books in English and Croatian that have been internationally reviewed: "Infrared Design", "Design of Digital Screening" and "Infrared Security Graphics" and which serve as a basis for courses on security graphics. She has held more than 40 lectures at international scientific conventions and 5 lectures as a a guest lecturer. Her lecture titled „Infrared Security Print: New Method Of Infrared Security Printing" (PIRA, Vilnius, 2009) was judged the greatest novelty in graphic technology of security printing. Two years later she was the ambassador and guest lecturer at the security printing conference titled "10th International Conference on Security Printing & Alternative Solutions in Central / Eastern Europe and Russia / PIRA International".

For the last five years she has published 8 A category papers entered in Current Contents (4) and SCI, SCI Expanded databases (4), 8 B category papers, 6 C category papers and 18 D category papers in the area of security graphics design that are relevant for the doctoral program area.

As the result of scientific work, together with her associates she has filed three patents from the area of protective security graphics at the State Intellectual Property Office; „Infrared printing with process dyes", "ZRGB apparatus for dual detection", "Protection of portrait reproduction with security portrait".

In the last five years, Ivana and her associates received 60 prestigious awards for INFRAREDESIGN findings at international innovation exhibitions.

In 2013 she successfully completed the supervisor workshop titled „Professionalization of PhD Supervision" at the University of Zagreb, mentored by dr. Lucas Zinner (University of Vienna).

Date of last academic appointment to the teaching and research position: May 25th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. V. Žiljak, K. Pap, I. Žiljak Stanimirović: "Development of a Prototype for ZRGB Infraredesign Device", Technical Gazette, Vol. 18, No.2, (2011.), p. 153-159, ISSN: 1330-3651 (SCI-Expanded, IF 0.083)
2. V. Žiljak, K. Pap, I. Žiljak Stanimirović, J. Žiljak Vujić: "Managing dual color properties with the Z - parameter in the visual and NIR spectrum", Infrared Physics & Technology, Vol. 55, Elsevier B.V. (2012.), p. 326-336, ISSN 1350-4495 (CC, SCI, SCI-Expanded, IF 0.932)
3. M. Rudolf, N. Stanić Loknar, I. Žiljak Stanimirović: " Infrared steganography with individual screening shapes applied to postage stamps with security features", Technical Gazette, Acceptance of Article Article No.: TV-20140718121246 (2014.), ISSN: 1330-3651 (SCI-Expanded, IF 0.083)

Scientific papers published in secondary sources

4. M. Turčić, V. Žiljak, I. Ž.–Stanimirović: „Individual Stochastic Screening for the Development of Computer Graphics", Acta Graphica, Vol 22, No 3-4 (2011.), p. 69-78, ISSN 0353-4707 (INSPEC).

5. J. Žiljak Vujić, I. Žiljak Stanimirović, O. Međugorac: „Hidden Information in Visual and Infrared Spectrum", Informatologia, Vol. 45, No. 2, (2012.), p. 96 - 102, ISSN: 1330-0067 (INSPEC; SCOPUS)
6. I. Žiljak Stanimirović, D. Agić, J. Žiljak Vujić: "Hidden Infrared Image in a Uniform Cmyk Separation Hue"; JGED, Novi Sad: Journal of Graphic Engineering and Design, Vol. 3. No2, (2012.), p. 8-12, ISSN 2217-379X
7. D. Agić, I. Stanimirović Žiljak, A. Agić, N. Stanić Loknar: "Degradation of Dual Image for Visual and near Infrared Spectrum at repeated CMYK/RGB Rendering", Journal of Graphic Engineering and Design, Volume 4 (1), (2013.), p.13-16. ISSN 2217-379X
8. N. Stanić Loknar, I. Žiljak Stanimirović, T. Koren: „Managing pixel deformation with pseudo-random values in infrared security graphics", TTEM Technics Technologies Education Management, Vol. 8, No. 1., (2013.), p. 59-69, ISSN 1840-1503 (SCI Expanded)
9. I. Žiljak Stanimirović, J. Žiljak Vujić, B. Morić, M. Rudolf: „Security printing with colorant control in the UV, visual and INFRARED spectrum", TTEM Technics Technologies Education Management, Vol. 8, No.2, (2013.) p. 480-485, ISSN 1840-1503 (SCI Expanded)
10. I. Žiljak Stanimirović; J. Žiljak Vujić; N. Stanić Loknar: „Marking of the camouflage uniform for visual and near infrared spectrum. // TTEM Technics Technologies Education Management. Vol. 8 (2013) , No. 3; 920-926, ISSN 1840-1503 (SCI Expanded)
11. J. Žiljak Vujić, I. Žiljak Stanimirović, S. Bjelovučić Kopilović, M. Friščić: „Zaštita prozirne savitljive plastične ambalaže postupkom INFRAREDESIGN®", "Polimeri" journal, Vol. 34 (2013) 2-3: p. 42-46, UDK 655.3.066.25:535.62 e-ISSN 1846 – 0828
12. J. Žiljak Vujić, I. Rajković, I. Žiljak Stanimirović: „Simultano video snimanje u vizualnom i infracrvenom spektru proširene V/Z stvarnosti", Polytechnic & Design Vol. 2, No. 1, 2014. p: 73 – 78, ISSN 1849-1995
13. D. Agić, I. Žiljak Stanimirović, A. Agić; „Appliance of twins as a way for achieving secure hidden image in infrared technology", Polytechnic & Design Vol. 2, No. 2, 2014.; P: 143 - 152, ISSN 1849-1995

Popis znanstvenih i umjetničkih projekata List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. University of Zagreb – research support program for arts and sciences 2013 – 2014 «Analiza i definiranje optimalnih parametara relevantnih za ispitivanje karakteristika maskirnih boja i uzoraka u UV – VIS do IR spektralnom području»; project manager: associate professor Martina Ira Glogar
2. University of Zagreb – research support program for arts and sciences 2014. «Evaluacija grafičkih parametara u multimedijskom okruženju»; project manager: associate professor Zjakić Igor
3. University of Zagreb – research support program for arts and sciences 2015. «Standardizacija grafičkih prikaza u multimedijskom okruženju»; project manager: full professor Nikola Mrvac

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 1

Course

Name of Course: **MARKETING COMMUNICATION MANAGEMENT**

Code: **PDS 114**

Semester: I. Semester - fundamental

Teacher: Mario Tomiša, associate professor

Course Summary

Role of marketing for a printing company. Concept of marketing, marketing management, market orientation, marketing acceptance in a printing company. Planning and marketing management - market dynamics, strategy planning, marketing management. Positioning - competition, micro and macro influence, marketing strategy. Concept and definition of management as a process. Management and environment - global, comparative, ethic and social dimension of marketing. Features of management - planning, goals, mission, strategic, tactical and operational objectives, management by pursuing objectives. Development management - group and group management, conflict management, communication management, human resources, process management, motivation, evaluation, compensation. Levels of management - business, manager roles, functions, levels, new management principles. Concept of communication - sign system, language in the process of communication, forms of communication, functions of communication, communication. Features of "ITK" - influences, advantages, buyers, synergies, customer relations, track ROI. Role of communication - models, advertising - classification, direct communication, sales promotion, personal selling, public relations, publicity, external advertising.

Communicating through news media - communication elements, size, illustration, colour, typography. Effects of communication - forming opinions, changing attitude, thinking and behavior. Company image - identity of image creation, activities important for the image. Elements of visual identity - electronic and printed communication; vendors, communication managers, packaging, advertising print, display. Product image - physical features, innovations, brand and packaging, attention, identification, psychological connotations, function, product price.

Brand image - brand identity, brand image, brand image components, market value, brand description, brand power, brand prospects, image management. Consumer decision process - recognition, information quest, alternative evaluation, decision to purchase, product evaluation. Promotion - communication goal, choosing appropriate messages, communication channels, promotional budget. Media analysis - three-dimensional media, TV, radio, advertising, newspapers. Aspects of a marketing communication - criticism and ethics, influence on social values, economic impact, effects on competition.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- advanced knowledge in the subject matter provided by the course
- specialized skills and techniques necessary for critical problem-solving by means of innovative approach in the field of marketing communications

- development of independence
- scientific and professional integrity in research activities

Description of teaching methods:

tutorials, seminar paper, presentation

Compulsory literature:

1. M. Tomiša, M. Milković: Grafički dizajn i komunikacija, Veleučilište u Varaždinu, Varaždin, 2013.
2. A book of student's choice (in the field of graphic engineering)

Additional literature:

1. (2010 – 2015) proceedings of the International Conference on Printing, Design and Graphic Communications "Blaž Baromić" 12-19
2. (2010 – 2015) proceedings of the International Conference "PRINTING & DESIGN, FS, Fotosoft

Number of lectures: 30

ECTS: 7

Teaching quality control:

Seminar paper, its presentation, evaluation of competences acquired in the course of lectures

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Mario Tomiša, associate professor

E-mail: mario.tomisa@unin.hr

Work Institution: University North, Koprivnica

Short CV:

Associate professor Mario Tomiša is the Vice-Rector of the University Centre Koprivnica at the University North. Main focus of his work is directed towards the development and management of communication projects, development and production of creative campaigns and corporate identity, and the development of new models for evaluating competences. He is an associate professor in science and an assistant professor in art. At the University North, he holds a number of design courses: Design basics, Graphic Design, Web Design, Creative Process, Information Design and others. He actively participates in scientific and professional conferences, and publishes many articles in the field of design, multimedia, typography, education, printing and web. He is also a co-owner of a creative agency Skin29, which received more than forty awards for graphic and digital design. He held four own exhibitions and took part at ten group exhibitions. He is a member of Mensa and the Croatian Designers Society.

Date of last academic appointment to the teaching and research position: 16. July 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Tomiša, M, Milković, M, (2013), Grafički dizajn i komunikacija, Varaždin, Veleučilište u Varaždinu.
2. Tomiša, M, (2015), Vizualni identitet i grafički standardi, Proceedings of the International conference "Printing & Design" 2015, 6 – 16.
3. Mrvac, N, Tomiša, M, Milković, M, (2010), Developing a modern model of higher education, TTEM - Technics Technologies Education Management, Volume (5) (2010), 700-709.
4. Tomiša, M, Mrvac, N, Milković, M, (2012), Determination of Graphic Design Qualitative Criteria, TTEM - Technics Technologies Education Management. Volume (7), 49-56.
5. Tomiša, M, Vusić, D, Milković, M, (2013), "The impact of the historical development of typography on modern classification of typefaces", Tehnički vjesnik, volume (20), 905-911.
6. Vinko Štajdohar, S, Tomiša, M, Valdec, D, (2013), "Oblikovanje web stranica primjenom CSS-a 3", Volume (7), 399-404.
7. Vusić, D, Tomiša, M, Milković, M, (2014), Determination of the influence of media on the neon colour spreading, Tehnički vjesnik, volume (21), 807-814.
8. Valdec, D, Čerepinko, D, Tomiša, M, Analitički pristup u određivanju geometrijskog prirasta RTV kod AM i FM rasterske tehnologije, Tehnički glasnik, volume (9), 446-450
9. Košak, B, Tomiša, M, Čačić, M, (2015), Statičko i dinamičko upravljanje web sadržajem, Tehnički glasnik, Volume (9) 77-83.
10. Mjeda, T, Tomiša, M, Milković, M, (2016), Economic and Social Development, 12th International Scientific Conference on Economic and Social Development, Volume (12), 145-154.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

National scientific and research program of the Ministry of Science, Education and Sports
Researcher

1. 2007. – 2013. „Evaluacija kvantitativnih i kvalitativnih kriterija procesa grafičke reprodukcije", Code: 128-1281955-1960

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **OPERATIONS RESEARCH**

Code: **PDS 115**

Semester: I. Semester - fundamental

Teacher: Damir Modrić, assistant professor

Course Summary

Introduction into operations research. Making business decisions by means of quantitative methods. Operational research in printing industry. Linear programming. Numerical problem solving LP. Theory of linear programming. The problem of transportation and distribution. Fundamentals of graph theory. Optimization on the graph. Network planning

- linear Programming (LP), LP and allocation of resources, definition of the LP, the condition of linearity
  - maximization / minimization problem.
  - graphical solution LP minimization, introduction, definition of Simplex method, Simplex model formulation (setting the mathematical model simplex table), the canonical problem of linear programming.
  - linear programming - simplex method with maximum objective function.
  - example of Simplex method for maximizing the similar / combined constraints
  - example containing combined constraints, for example minimization of similar restrictions.
  - dual problems
    - concept of the primary problem (primal)
    - concept of dual problem (dual)
    - connection between primal and dual
    - formation of the dual problem
  - nonlinear Programming
  - sensitivity Analysis: Changes in the objective function, Formulation of Transportation Problem (TP)
  - setting up a mathematical model of TP
  - solving TP by means of the Simplex method
  - Transportation and assignment problem
  - Methods for determining the basic solution:
    - Feasible Solution: North-West corner rule, Lowest cost entry method; :
    - Optimal Solution: The Stepping Stone Method, MODI (modified distribution) method, Vogel's Approximation Method (VAM), ...
  - degenerate and non-degenerate basic feasible solution
  - The Balanced Transportation Problem
  - special transport problems

- The travelling salesman problem (TSP)
  - Knapsack problem
  - Introduction into network planning

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to understand and analyse management problems in industry, leading to a more efficient use of existing resources (capital, materials, personnel and equipment)
- ability to plan the acquisition of new resources
- competence to identify and develop operational research models from verbal descriptions of existing system
- knowledge of formulating mathematical models for quantitative analysis of management problems in the industry
- skills in the use of operational research approaches and computer tools to solve real problems in the industry
- ability to comprehend mathematical tools necessary to solve optimization problems
- competence to use mathematical models to analyse real problems in operational research
- skills to use mathematical software to solve proposed models
- competence to develop a report describing the model and techniques
- ability to analyse the results and submit recommendations applicable in decision-making processes in the field of management

Description of teaching methods:

Lectures and case studies.

Some case studies will be used to integrate course topics and show students how various techniques interrelated and how they can be applied to real problems in the industry

Compulsory literature:

1. Frederick S. Hillier, Gerald J. Lieberman: Introduction to operations research; The McGraw-Hill Companies Inc., 2001
2. H. Pašagić; Matematičke metode u prometu, Fakultet prometnih znanosti, Zagreb, 2003.
3. R. Bronson and G., Naadimuthn; Operations Research, McGRAW - HILL, New York, 1997.
4. Wayne L. Winston: Operations Research - applications and algorithms; 2004 Brooks/Cole, a division of Thomson Learning, Inc. Thomson LearningTM

Additional literature:

1. Kalpić, Mornar: Operacijska istraživanja, DRIP, Zagreb, 1996.
2. S. Krčevinac i drugi; Operaciona istraživanja 1 i 2, Fakultet organizacionih nauka, Beograd, 2006.

Number of lectures: 25

ECTS: 6

Teaching quality control:

Oral exam in the field of study (course materials available in the repository).

Presentation (up to 10 pages) of a practical or theoretical example regarding any branch of operational research.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Damir Modrić, assistant professor

E-mail: damir.modric@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Assistant professor Damir Modrić, born in 1957, teaches several courses of physics in graphic technology at the Faculty of Graphic Arts in Zagreb. He is the author of more than 40 scientific and professional papers in the field of physics in graphic technology. The focus of his interest, in the context of hypotheses and research objectives, are concepts related to the theory of radiative transfer and the interaction of radiation with the system paper – printing ink, which disperses and absorbs light, using a stochastic model based on the Monte Carlo method and its application in the printing industry. He is a member of several scientific committees of international scientific conferences and is one of the chief editors of the scientific journal "Acta Graphica".

Since 2014 he is the lecturer of the course "Quantitative Methods" at the University North.

Date of last academic appointment to the teaching and research position: 6. September 2010

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. D.Keček, D.Modrić, M.Stojić: VJEROJATNOST I STATISTIKA, University North, 2012 ; ISBN: 978-953-7809-11-9
2. Damir Modrić; Katja Petric Maretić; Marin Milković. Modelling light dispersion in the printing substrate within the Monte Carlo method. // Tehnički vjesnik 19 (2012) , 1; 77-81 (SCI - Expanded) (if – 0,615).
3. Damir Modrić, Katja Petric Maretić and Aleš Hladnik. Modeling spatial reflection from an uncoated printing paper using Monte Carlo simulation. // Nordic Pulp & Paper Research Journal. Volume 27 (2012) , Issue No. 5; 968-975 (CC) (if – 1,071)
4. K. Petric Maretić; M. Milković; D. Modrić: Akaike information criterion in the edge analysis of the screen element // Tehnički vjesnik 20 (2013), 3; 441-447 (SCI - Expanded) (if – 0,615).
5. K. Hajdek; P. Miljković; D. Modrić: Some aspects of modeling of line screen element reflectance profile within the Monte Carlo method. // Tehnički vjesnik, Vol.21 No.4 (2014); 779-788 (SCI - Expanded) (if – 0,615).

6. Modrić, Damir; Petric Maretić, Katja; Hladnik, Aleš: Determination of point-spread function of paper substrate based on light-scattering simulation. // Applied Optics. 53 (2014) , 33; 7854-7862 (CC) (if – 1,649)

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Project associate: 128-1281955-1960 "Evaluacija kvantitavnih i kvalitativnih kriterija procesa grafičke reprodukcije", financed by the Ministry of Science, Education and Sports (2007 – 2013).
2. Associate on the project of the Croatian Science Foundation IP-2014-09-1218 „Definiranje mogućnosti uporabe mini dentalnih implantata (MDI) i njihovi rezultati u in vitro i u kliničkim prospektivnim istraživanjima" (2015-2019).

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 2

Course

Name of Course: **QUALITATIVE RESEARCH IN GRAPHIC TECHNOLOGY**

Code: **PDS 116**

Semester: I. Semester - fundamental

Teacher: Mile Matijević, assistant professor

Course Summary

Qualitative methodology as a new paradigm of graphic science. Graphic science as a process of qualitative discursive competitiveness. Qualitative holistic approach to graphic science methodology. Cognition/knowledge, question of method, quantitative, qualitative, research methods and graphic science. Observation, interviews, surveys, scalers, content analysis processes, tests, standard instruments of graphic science evaluation, topics and contents of qualitative graphic methodology. Creation of graphic ideas, analysis, structure, cooperation, acceptance of ideas, application of ideas, responsibility, making of results. Qualitative methodological approaches to graphic science: seeing and selecting problems, defining probles, evaluation criteria, state definition, state examination, solution optimisation, solution formation, solution implementation, systematisation of existing experiences, formation of graphic project and graphic project evaluation. Identification, selection and development of human resources in graphic science. Plan, procedures and methods of qualitative research: hypothesis, goals, methods, protocol and plan of research, keywords and research ethics. Logical argumentation and elaboration of final paper in graphic field.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- advanced knowledge in the field of qualitative research in graphic technology
- specialized skills and techniques necessary for the critical problem-solving by means of innovative approaches
- independence, scientific and professional integrity

Description of teaching methods:

Tutorial

Compulsory literature:

1. Biagi, S. (2014), Media/Impact: An Introduction to Mass Media, Cengage Learning, Boston
2. McQuail, D. (2010), McQuail's Mass Communication Theory, SAGE, London
3. Jensen, K.B. (2013), A Handbook of Media and Communication Research: Qualitative and Quantitative Methodologies, Routledge, London and New York
4. Brennen, B. (2012), Qualitative Research Methods for Media Studies, Routledge, London and New York

Additional literature:

1. Adams R.C., (2004), Social Survey Methods for Mass Media Research, LEA Publishers, Hillsdale, Reprinted (1989)
2. Jensen K.B. & Jankowski N.W., (2005), A Handbook of Qualitative Metodologies for Mass Communication Research, Routledge, London and New York, Reprinted (1999)

3. Kaase H.M. & Schulz W., (1999), Massenkommunikation, Theorien, Methoden, Befunde, Westdeutscher Verlag, Opladen
4. Kukić, S. & Markić,B., (2006), Metodologija društvenih znanosti, Metode, tehnike, postupci i instrumenti znanstveno istraživačkog rada, Ekonomski fakultet Sveučilišta u Mostaru, Mostar/Zagreb
5. Lindlof, T.R., (2004), Qualitative Communication Research Methods, Sage Publications, London
6. Plenković, M., (2003), Kvalitativna metodologija (Priručnik), Poslijediplomski i doktorski studij iz informacijskih znanosti & HKD, Zagreb
7. Priest, S.H., (2006), Doing Media Research, An Introduction, Sage Publication, London

Number of lectures: 25

ECTS: 6

Teaching quality control:

Logical argumentation and final paper in the graphic field.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Mile Matijević, assistant professor

E-mail: mile.matijevic@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Assistant professor Mile Matijević was born on April 10, 1977 in Vinkovci. He graduated in 2000 at the Faculty of Graphic Arts, University of Zagreb. He defended his doctoral thesis entitled “The visual effects of expansion and simultaneous contrast in graphic communication" under the mentorship of full professor Nikola Mrvac in 2013 at the same faculty. He is an active participant in scientific and professional conferences. He has published 28 scientific papers, 6 of which in journals in the CC and SCI database. Mile Matijević focuses his research on graphic and multimedia technology and the reproduction and perception of visual information within communication systems.

Date of last academic appointment to the teaching and research position: 13. July 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Milković, Marin; Matijević, Mile; Mrvac, Nikola; (2012), Intensity evaluation of the spreading and simultaneous contrast effects based on the dotted White’s samples. // Tehnički vjesnik 19, 3; 521-529.
2. Milković, Marin; Mrvac, Nikola; Matijević, Mile; (2013), Evaluation of the effect of retinal localized chromatic adaptation intensity on desaturated achromatic reproductions derived by standard rendering methods. // Color Research & Application. 38, 4; 277 – 283
3. Matijević, Mile; Mrvac, Nikola; Mikota, Miroslav; (2014), The Effect of Expansion and Simultaneous Contrast in Modificated Figural Dotted and Groundal Dotted Illusions. // Tehnički vjesnik 21, 6; 1297-1301.
4. Budimir, Ivan; Mrvac, Nikola; Matijević, Mile; (2015), The influence of the thickness of the grid in munker-white effect. // Tehnički vjesnik 22, 2; 1297-1301.
5. Mikota, Miroslav; Pavlović, Ivana; Matijević, Mile; (2015), Utjecaj promjena RGB kanala digitalnog zapisa fotografije uz zadržavanje ikoničnosti na percepciju modne fotografije. // Tekstil. 64 , 1-2; 13-19

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. "Evaluacija kvantitativnih i kvalitativnih kriterija procesa grafičke reprodukcije", Code: 128-1281955-1960, key researcher: full professor Nikola Mrvac, 2007 – 2013 „Evaluacija kvantitativnih i kvalitativnih kriterija procesa grafičke reprodukcije“, Code: 128-1281955-1960

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **METHODOLOGY OF SCIENTIFIC RESEARCH**

Code: **PDS 117**

Semester: I. Semester - fundamental

Teacher: Marin Milković, full professor

Course Summary

Science theory. Scientific research methods and methodology. Classification method. Scientific methods. Scientific and technological information. Information source. Conditions for scientific research. Planning and managing scientific research. Research and development. Types of scientific research and expert papers. Composition, style and language. Parts of the Books, papers and scientific documentation. Organization of scientific research. Writing doctoral thesis: Methodology. Doctoral thesis: Defence. The Science and Higher Education Act.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to form a correct and precise opinion, express it and base their actions accordingly
- competence to carry out scientific and technical research, evaluate and interpret the results and apply them properly
- acquisition of advanced knowledge in the field of the methodology of scientific research
- specialized skills and techniques necessary for critical problem-solving by means of innovative approaches
- independence, scientific and professional integrity

Description of teaching methods:

Tutorial, seminar paper, presentation

Compulsory literature:

1. Milica Gačić "Pisanje znanstvenih i stručnih radova", Školska knjiga, Zagreb 2012.
2. A book of student's choice (from the field of graphic engineering)

Additional literature:

1. (2010 – 2015) proceedings of the International Conference on Printing, Design and Graphic Communications "Blaž Baromić" 12-19
2. (2010 – 2015) proceedings of the International Conference "PRINTING & DESIGN, FS, Fotosoft

Number of lectures: 20

ECTS: 5

Teaching quality control:

Seminar paper, its presentation, evaluation of competences acquired in the course of lectures

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Marin Milković, full professor

E-mail: marin.milkovic@unin.hr

Work Institution: University North, Koprivnica

Short CV:

Marin Milković was born on 23. February 1975 in Rijeka. He graduated in 1998 at the Faculty of Graphic Arts in Zagreb. The same year he started working in Novi List and simultaneously in the vocational school for chemistry and graphic arts in Rijeka, where he taught courses in graphic technology and prepress.

From 2000 to 2012 he was employed in the Croatian Institute of Graphic as a member of the Board. Since 2008 he has been a teacher at the former Polytechnic in Varaždin.

In his previous work he continuously perfected in the field of quality management. In 2001 he earned the title of internal auditor for ISO 9001: 2000 and ever since 2002 has been registered as ITACA -MANAGER QMS Auditor for ISO 9001: 2000. In accordance with his positions and duties, he managed and conducted investment and technology projects and developed a number of professional and development projects related to organizational activities and the introduction of new technologies.

He is currently the Rector of the University North.

Date of last academic appointment to the teaching and research position: 19. July 2013

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Vusić D, Mrvac, N, Milković, M, (2011), The neon colour spreading effect in various surround ambient conditions. Tehnički vjesnik, volume (18), 219-225.
2. Milković, M, Mrvac, N, Vusić, D, (2011), Evaluation of the chromatic adaptation effect intensity by "tuning" the desaturated achromatic reproductions printed in the offset, Tehnički vjesnik , volume (18), 4; 519-528.
3. Vusić, D, Milković, M, Mrvac, N, (2012), The Influence of the Primary Colour Stimuli Selection on the Neon Colour Spreading, TTEM - Technics Technologies Education Management. Volume (7), 81-87.
4. Tomiša, M, Mrvac, N, Milković, M, (2012), Determination of Graphic Design Qualitative Criteria, TTEM - Technics Technologies Education Management. Volume (7), 49-56.
5. Milković, M, Mrvac, N, Zjakić, I, (2012), Comparative Analysis of the Intensity of the Induction and Assimilation Effects of the Equivalent Geometric Structures of Graphic Reproductions, TTEM - Technics Technologies Education Management. Volume (7) 49-56.

6. Milković M, Matijević M, Mrvac N, (2012), Intensity evaluation of the spreading and simultaneous contrast effects based on the dotted White's samples., Tehnički vjesnik, volume (19), 521-529.
7. Milković, M, Mrvac, N, Matijević, M, (2013), Evaluation of the effect of retinal localized chromatic adaptation intensity on desaturated achromatic reproductions derived by standard rendering methods, Colour research and application. Volume (38), 277-283.
8. Vusić, D, Tomiša, M, Milković, M, (2014), Determination of the influence of media on the neon colour spreading, Tehnički vjesnik, volume (21), 807-814.
9. Čerepinko, D, Mrvac, N, Milković, M, (2015), Determination of Visual Interest Points of Graphical User Interfaces for Tablet Newspapers Application, Tehnički vjesnik : znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. Volume (22), 659-665.
10. Tomiša, M, Milković, M, (2013), Grafički dizajn i komunikacija, Varaždin, Veleučilište u Varaždinu.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

National scientific and research projects of the Ministry of Science, Education and Sports

Researcher

1. 2007. – 2013. „Evaluacija kvantitativnih i kvalitativnih kriterija procesa grafičke reprodukcije", Code: 128-1281955-1960

International scientific and research projects

1. 2010. - 2013. „Modernising Teacher Education in European Perspective", br. JP 159048-2009, within the framework of the EU research program TEMPUS IV,
2. 2011. – 2012. „Improvement of reliability in production and exploitation of welded construction and products. Croatian-Montenegrin project.

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

INFORMATION PACKAGE

II. SEMESTER – GRAPHIC ENGINEERING

Course

Name of Course: **IMAGE DISPLAY MODELS IN A VARIETY OF MEDIA**

Code: **PDS 201**

Semester: II. Semester - Graphic engineering

Teacher: Lidija Mandić, associate professor

Course Summary

The course provides students with the basic theoretical knowledge of models for displaying colours in different systems and directs them to the problems in the present day image reproduction. Some model preferences have been implemented in the colour management system. Spatial and temporal characteristics of vision. Terminology used in the models for displaying colours (lightness, brightness, colourfulness, saturation, chroma). Phenomena that affect the display of images in different media due to changes in the background, the level of brightness (simultaneous contrast, spreading, Hunt effect, etc.). Defining the condition for observation as one of the important factors of models for displaying colours. The importance of chromatic adaptation in models for displaying colours, explanation and their role. Explanation of some models for displaying colours that are embedded in systems for managing colours in graphic reproduction: Hunt's model, RLAB model, CIECAM 97. Construction of models for displaying colours: input data, inverse model, testing. Disadvantages and advantages of the aforementioned models and what all parameters are included in each model for displaying colours. Practical application by means of Matlab program, as well as the application of inverse models. Current research.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- knowledge required to work in a multimedia environment with regard to visual communication
- skills to analyse and evaluate new models
- ability to employ knowledge and skills in the field of image processing and application in own scientific research

Description of teaching methods:

Lectures, tutorials

Compulsory literature:

1. M. Fairchild, Colour Appearance Models, Addison Wesley, 1998
2. E.J.Giorgianni,T.E.Madden, Digital ColorManagement ,Addison Wesley, 1998

Additional literature:

1. Rafael C. Gonzalez, Richard E. Woods-Digital Image Processing-Prentice Hall (2008)
2. Noboru_Ohta,_Alan_Robertson]_Colorimetry_Fundamentals and Applications

Number of lectures: 15

ECTS: 4

Teaching quality control:

Research (seminar paper). Oral exam.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Lidija Mandić, associate professor

E-mail: lidija.mandic@grf.hr

Work institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Lidija Mandić, PhD, is associate professor at the Department of Reproduction Photography at the Faculty of Graphic Arts. She graduated, earned her master's degree and earned her PhD degree in 2007 at the Faculty of Electrical Engineering and Computing.

The area of her research and teaching interests are colour management systems, image display models, colour display models, testing of all types of screens and application of new technology in graphic process.

Lidija Mandić was external associate at the Ministry of science project 0036015 "Multimedia communication systems", and today she is an associate at the project 036-0361630-1635 "Quality management of image in radio fusion of digital video signal".

She is research project manager of the project entitled "Digitalisation of museum painting heritage". She is deputy research project manager in projects funded by the Fund for University development: „Excellence centre for computer vision" and „ICT systems for people with complex communication needs". Lidija Mandić is program coordinator of CEEPUS program CIII-RS-0704-01-1213 „Research and education in the field of Graphic Engineering and Design". She is also team manager at the Faculty of Graphic Arts on an IPA project ICT Competence Network for Innovative Services for Persons with Complex Communication Needs.

Lidija Mandić is the author of 5 papers in CC and SCI journals, 3 papers in other journals, 59 papers in international scientific conference proceedings. She has been a member of editorial staff of "Acta Graphica" (HR) since 2009. She is also a reviewer for the IJECES-International Journal of Electrical and Computer Engineering Systems, JIE-Journal of Electronic Imaging, Tehnički vjesnik, Tekstil, Acta Graphica, conferences: ISPA i IEEE ICIP.

Date of last academic appointment to the teaching and research position: May 20th 2013

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Poljičak, Ante; Mandić, Lidija; Agic, Darko, Robustness of a DFT Based Image Watermarking Method Against AM Halftoning, Tehnički vjesnik, vol. 18 (2011) , 2; 161-166

2. Strgar Kurečić, Maja; Agić, Darko; Mandić, Lidija, Developing a custom colour target for artwork imaging, Imaging science journal. 59 (2011) , 6; 317-331
3. Poljičak, Ante; Mandić, Lidija; Agić, Darko, Discrete Fourier transform–based watermarking method with an optimal implementation radius, Journal of electronic imaging. 20 (2011) , 3; 033008-1-033008-8
4. Poljičak, Ante; Agić, Darko; Mandić, Lidija; Strgar Kurečić, Maja, Suitability of the RGB Channels for a Pixel Manipulation in a Spatial Domain Data Hiding Techniques. // Acta graphica. 21 (2010) , 1-2; 1-5
5. Poljičak, Ante; Mandić, Lidija; Strgar Kurečić, Maja, The Influence of Image Enhancement Filters on a Watermark Detection Rate, Acta graphica. 22 (2011) , 3-4; 53-60
6. Poljičak, Ante; Mandić, Lidija; Strgar Kurečić, Maja, Improvement of the Watermark Detector Performance Using Image Enhancement Filters // PROCEEDINGS IWSSIP 2012 / Rupp, Markus ; Wistawel, Bernhard (ur.). Beč, 2012. 74-77
7. Mandić, Lidija; Strgar Kurečić, Maja; Poljičak, Ante. Determination of Background Colour on Colour Appearance on Monitor // AIC Colour 2013 conference proceedings / MacDonald, Lindsay ; Westland, Stephen ; Wuerger, Sophie (editor). Newcastle Upon Tyne : The Colour Group, 2013. 1093-1096
8. Mandić, Lidija; Trojko, Domagoj; Pibernik, Jesenka; Dolić, Jurica. THE INFLUENCE OF COLOR IN DIGITAL MEDIA ON USER EXPERIENCE // GRID 2014 7th International Symposium on Graphic Engineering and Design / Dragoljub Novaković (editor). Novi Sad : University of Novi Sad Faculty of Technical Sciences, 2014. 457-460
9. Mandić, Lidija; Poljičak, Ante; Strgar Kurečić, Maja. THE USE OF COLOR IN VISUAL PRODUCT MESSAGE REDESiGN // Proceedings of 7th International Symposium on Graphic Engineering and Design / Dragoljub Novaković (editor). Novi Sad : University of Novi Sad Faculty of Technical Sciences, 2014. 423-426
10. Kedmenec, Luka; Poljičak, Ante; Mandić, Lidija. Copyright protection of images on a social network // Proceedings of ELMAR-2014 56th International Symposium ELMAR-2014 / Dijana Tralić, Mario Muštra, Branka Zovko-Cihlar (ur.). Zagreb : Faculty of Electrical Engineering and Computing, University of Zagreb, 2014. 175-178
11. Jesenka Pibernik, Bojan Kanižaj, Jurica Dolić, Lidija Mandić, Maja Strgar-Kurečić. HEURISTIC EVALUATION OF ICT APLICATIONS FOR PERSONS WITH COMPLEX COMMUNICATION NEEDS // Proceedings - SIGT - 7th Symposium of Information and Graphic Arts Technology / Raša URBAS (editor).Ljubljana : University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Chair of Information and Graphic Art Technology, 2014. 98-102
12. Alena Uus, Panos Liatsis, Ronak Rajani, Lidija Mandic. The Impact of Boundary Conditions in Patient-Specific Coronary Blood Flow Simulation // Proceedings of IWSSIP 2014 21st International Conference on Systems, Signals and Image processing / M. Muštra, D. Tralić, M. Grgić, B. Zovko-Cihlar (editor). Zagreb : Faculty of Electrical Engineering and Computing, University of Zagreb, 2014. 35-38
13. Strgar Kurečić, Maja; Mandić, Lidija; Poljičak, Ante; Milčić, Diana.

14. Colour Management for High Quality Reproduction on Uncoated Papers // AIC2015 TOKYO Colour and Image Proceedings / Steering Committee of AIC2015 TOKYO, The Colour Science Association of Japan (editor). Tokyo: Colour Science Association of Japan (CSAJ), 2015. 633-638

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. IPA project ICT Competence Network for Innovative Services for Persons with Complex Communication Needs (2013-2015), research project manager at the level of the Faculty of Graphic Arts
2. Research and education in the field of Graphic Engineering and Design, coordinator of the CEEPUS program CIII-RS-0704-01-1213;
3. Digitalizacija muzejske slikarske baštine (128-1281957-1958), project financed by Ministry of Science, Education and Sports of the Republic of Croatia (1. January 2007 - October 2013); -researcher, research project manager since 2011
4. Center of Excellence for Computer Vision (CRV), project financed by the Development fund of the University of Zagreb (2012), assistant research project manager;
5. ICT sustavi za osobe sa složenim komunikacijskim potrebama, project financed by project financed by the Development fund of the University of Zagreb (2012), assistant research project manager;
6. Cost FP 1104 New possibilities for print media and packaging - combining print with digital, 2012 – 2016 - researcher
7. Upravljanje kvalitetom slike u radiodifuziji digitalnog videosignala (036-0361630-1635), Project financed by the Ministry of Science, Education and Sports of the Republic of Croatia, 1. January 2007 - October 2013) - researcher;
8. Visokotehnološka rješenja za razvoj jezičnih sposobnosti kod složenih komunikacijskih potreba, Project – short-term research funding by the University of Zagreb (June 2015 - December 2015); research project manager
9. Metode evaluacije grafičkih korisničkih sučelja aplikacija namijenjenih korisnicima sa kompleksnim komunikacijskim potrebama, Project – s short-term research funding by the University of Zagreb (November 2013 - June 2014); researcher;
10. Inovativne usluge za osobe sa složenim komunikacijskim potrebama zasnovane na umrežavanju pametnih novih uređaja (AAC-WEARABLES), project financed by The Foundation of the Croatian Academy of Arts and Sciences, 2015; researcher

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 1

Course

Name of Course: **OPTIMIZATION OF CONSTRUCTION PARAMETRES OF GRAPHIC MACHINES**

Code: **PDS 202**

Semester: II. Semester - Graphic engineering

Teacher: Dubravko Banić, associate professor

Course Summary

The purpose of the Course is to give insight into modern printing machines.

Students learn about constructive solutions provided by printing machines by means of methodical design used as such in modern business of industrial product design. In this context the industrial product is seen as a complex system which is a subsystem of the entire environment.

The students critically observe the system man – printing machine - environment, while insisting on considering the complexity of dynamic networks of mutual links and the conditionality of certain parts of this system throughout the "lifespan" of the machine - design of the machine, its installation and operation up to its disposal and recycling. The observed relationship between man and machine, as well as their artificial, natural and social environment, is based on an example - fundamental, technical and communicative and symbolic functions are taken into account.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to evaluate different constructive solutions in the field of graphic machines

Description of teaching methods:

Lectures and tutorials. Oral presentation of a topic, analysis of subject matter, encouragement to make independent conclusions

Compulsory literature:

1. David J. Gunkel(2012) The machine question: critical perspectives on al, robots and ethics, Cambridge, London
2. E. Oberšmit, (1985) Nauka o konstruiranju, metodičko konstruiranje i konstruiranje pomoću računala, FSB, Zagreb,
3. T. Filetin : (2005) Suvremeni materijali i postupci, Hrvatsko društvo za materijale i tribologiju, Zagreb
4. R. Grubišić: (2002)Teorija konstrukcija - primjeri dinamičke analize elemenata, FSB, Zagreb
5. V. Ivušić: (2002) Tribologija, Hrvatsko društvo za materijale i tribologiju,Zagreb
6. T. Filetin: (2000)Pregled razvoja i primjene suvremenih materijala, Hrvatsko društvo za materijale i tribologiju, Zagreb

Additional literature:

1. Robert L. Mott, (2013) Machine Elements in Mechanical Design, Prentice Hall
2. W. Walenski, (1991) Offsetdruck, Polygraph Verlag, Frankfurt/Main,

3. B.Olech, (1999) Tiefdruck, Grundlagen und Verfahrensschritte der modernen Tiefdrucktechnik, Polygraph Verlag, Frankfurt/Main,
4. V. Hegešić, J. Baldani: (1990) Mehaničke konstrukcije, Sveučilišna naklada Zagreb,
5. V. Krstelj: (2003) Ultrazvučna kontrola, FSB, Zagreb

Number of lectures: 20

ECTS: 5

Teaching quality control:

Compulsory participation in class (20% of the final grade); project assignment (80% of the final grade)

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Dubravko Banić, associate professor

E-mail: dbanic@grf.hr

Work institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Dubravko Banić graduated in 1993 from the engineering study program at the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb. The subject of his graduate thesis was: Analysis and construction of mixers, and it was supervised by Vladimir Koharić, PhD, full professor.

He defended his doctoral dissertation (topic: Exploring the situation while maintaining printing rotations; supervised by V. Salamon, PhD, full professor) at the Faculty of Graphic Arts in Zagreb in 2006, and earned a PhD degree in the area of engineering sciences, field graphic technology. Since 1994, he has worked at the Faculty of Graphic Arts, University of Zagreb, as an expert associate at the Department of Graphic Machines. He was appointed senior assistant in 2006 and assistant professor since 2009.

He was course director for six courses: Graphic machines 1, Graphic machines 2, Automatics and maintenance of graphic machines, Re-engineering in graphic production, Optimization of parameters in the construction of graphic machines and Visualization in modelling graphic products.

He participated in the following scientific project: "A study of features and formulations of digital printing paper"; research project manager full professor Stanislav Bolanča.

Since 2007, he has participated in the following scientific project entitled "Standardization of ecologically acceptable processes of graphic communications"; research project manager: full professor Diana Milčić.

Within the area of graphic technology, he is primarily involved in research regarding the determining of the situation and proposing models for improvement of maintenance in graphic facilities, mechanisms in graphic machine constructions and the analysis of machine parameters that affect the quality of the final graphic product.

He is the author of about 80 scientific and professional papers.

Date of last academic appointment to the teaching and research position: July13th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Šarčević Iva, Banić Dubravko, Milčić Diana, (2013), Colorimetric Differences on Wood Susbstrate due to Varnishing Influence, Acta technica corviniensis - Bulletin of Engineering. 1, 91-94
2. Donevski Davor, Milčić Diana, Banić Dubravko, Poljaček Mahović Sanja, Tomašegović Tamara, (2014), Approaches to linearization in ICC profiles, International Circle
3. Donevski Davor, Milčić Diana, Banić Dubravko, (2014), THE USE OF SHOCK RESPONSE SPECTRUM IN PROTECTIVE PACKAGING DESIGN, Novaković, D. (u, Novi Sad : Faculty of Technical Sciences, 2014. 171-174
4. Šarčević Iva, Banić Dubravko, Milčić Diana, (2012), Personalization of a Product from Mass Production, Mass Customization and Open Innovation in Central Europe / Anišić, Zoran ; Freund, Robert (ur.).Novi Sad : Faculty of Technical Sciences in Novi Sad, . 203-206
5. Donevski Davor, Milčić Diana, Banić Dubravko, (2011), Polynomial Color Reproduction Device Model Term Significance, Norrkoping,

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Razvoj sustava ekološki prihvatljivih modela pakiranja, research support program 2013
2. Utjecaj ne-drvnih vlakanaca na kemijsku stabilnost grafičkog proizvoda, research support program 2015

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **PHYSICAL PRINCIPLES OF NON-DESTRUCTIVE METHODS FOR GRAPHIC REPRODUCTION MEASUREMENT**

Code: **PDS 203**

Semester: II. Semester – Graphic engineering

Teacher 1: Vesna Džimbeg Malčić, associate professor

Teacher 2: Damir Modrić, assistant professor

Course Summary

Overview of modern non-destructive methods in printing technology. Electron Microscope, Scanning (Scanning Electron Microscopy, SEM) and electronic microscoping in the standard ambient conditions (Environmental Scanning Electron Microscopy, ESEM). X-spectroscopy as a result of the interaction of fast electrons with the sample. Spectroscopy in the visible, UV (Ultra Violet Resonance Raman Spectroscopy) and infrared (FTIR) part of the electromagnetic radiation spectrum and the associated measuring instruments. Time resolved spectroscopy (TRS). Photoacoustic sensors (PAS): photoacoustic spectroscopy, photoacoustic scattering detection.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- acquisition of knowledge and skills necessary for understanding the physical principles of non-destructive testing
- insight into the application of non-destructive testing in real printing conditions
- development of independence and responsibility
- comprehensive understanding of the principles and importance of non-destructive testing
- ability to understand and analyze the basic principles, advantages and limitations of basic methods of non-destructive testing
- ability to formulate mathematical models for quantitative analysis of non-destructive testing in the printing industry
- comprehension of mathematical tools required to analyze the data obtained by non-destructive testing
- independence in learning, practical skills and teamwork in graphic techniques used to produce specific graphic products

Description of teaching methods:

Tutorials (bibliography, define interest area), agreement on measuring (samples, method...)

Compulsory literature:

1. J. M. Palmer: The measurement of transmission, absorption, emission and reflection; Handbook of optics II, McGraw-Hill, New York (1995)
2. N. Pauler: Paper optics, A.B. Lorentzen & Wettre, Sweden (2012)
3. R. Johnson: Environmental Scanning Electron Microscopy, ElectroScan Corporation, Wilmington, Massachusetts, USA (1996)

4. S. L. Fleger, J. W. Heckman, Jr., L. Karen: Scanning and Transmission Electron Microscopy, Oxford University Press, Oxford, USA (1998)

Additional literature:

1. B. Stuart: Infrared Spectroscopy: Fundamentals and Applications , 2004 John Wiley & Sons, Ltd ISBNs: 0-470-85427-8 (HB);
2. JEROME J. WORKMAN, JR.: Review of Process and Non-invasive Near-Infrared and Infrared Spectroscopy: 1993–1999, Analytical Science & Technology, Kimberly-Clark Corp. 2100 Winchester Road Neenah, WI 54956 (USA), 1999 by Marcel Dekker, Inc.

Number of lectures: 30

ECTS: 7

Teaching quality control:

Research paper for a conference or a journal

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher 1

Name and Surname Vesna Džimbeg Malčić, associate professor

E-mail: vdzimbeg@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Vesna Džimbeg-Malčić was born in 1956 in Zagreb, where she completed her elementary education and graduated from high school. In 1981, she graduated in Engineering physics and in 1990 she completed her Master's degree, which was a part of her postgraduate studies of natural sciences, programme type: atomic and molecular physics. She completed her doctoral thesis, which was entitled ''Application of Kubelka-Munk theory and Yule-Nielsen effect on print substrates'', in 2005 at the Faculty of Graphic Arts where she has been working at the Department of Physics in Graphic Technology since 1984. She was appointed to assistant professor position in 2006 and associate professor in 2011. She started her professional work in science at the University's Institute of Physics, Department of atomic and molecular physics where she conducted Spectroscopic research in Electromagnetic radiation. In 1998, she started working on interaction of controlled electromagnetic radiation with selected print substrates, and on the analysis of optical features of absorbent and non-absorbent print substrates. She has been actively participating in a science project which is a part of National Research Program of Ministry of Science and Bilateral Croatian – Slovenian Cooperation Programme in the science and technology discipline. She has been assigned to international science programme COST E32 (European Cooperation in the field of Scientific and engineering research) as well.

As a result of her extensive science research, she has published around 40 science papers. 3 (three) of those were published as chapters in science books (serial publications), 5 (five) of them were published with CC or SCI

indexes, and 6 (six) were published in secondary publications. She has been an active publisher and a member of international and national science symposiums. Consequently, she has published 17 (seventeen) science papers in International Symposium Records and 10 (ten) of them at National Science Symposiums. She contributed immensely to the modification of curriculum at the Faculty of Graphic Arts, organized two new courses and adjusted curriculum to current undergraduate and graduate studies.

Date of last academic appointment to the teaching and research position: April 18th 2011

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Itrić, Katarina; Džimbeg-Malčić, Vesna; Modrić, Damir, Optical deterioration of coated wrapping paper. // Acta graphica. 26 (2015) , 1-2; 5-10
2. Plazonić, Ivana; Barbarić-Mikočević, Željka; Džimbeg-Malčić, Vesna, Optical stability of office papers treated with cocamidopropyl betaine. // Wood Research. 60 (2015) , 2; 263-272
3. Čerepinko, Darijo; Džimbeg-Malčić, Vesna, Pregled tehnologija elektroničkog papira i pretpostavke budućeg razvoja e-papira. // Tehnički glasnik. 7 (2013) , 1; 91-96
4. Barbarić-Mikočević, Ž., Plazonić, I.; Džimbeg-Malčić, V., (2013), The deinkability improvement of offset prints made from a two-side coated substrate, BioResources, 8, 557-570
5. Bates, Irena; Džimbeg-Malčić, Vesna; Itrić, Katarina, Optical deterioration of samples printed with basic Pantone inks. // Acta graphica, Journal for Printing Science and Graphic Communications. 23 (2012) , 3-4; 79-90
6. Džimbeg-Malčić, Vesna; Barbarić-Mikočević, Željka; Itrić, Katarina, Kubelka-Munk Theory in Describing Optical Properties of Paper (II). // Tehnički Vjesnik-Technical Gazette. 19 (2012) , 1; 191-196
7. Plazonić, Ivana; Dzimbeg-Malčić, Vesna; Barbarić-Mikočević, Željka, A Novel Eco-Alkali Chemistry in Newspaper Flotation Deinking. // Acta graphica. 23 (2012) ; 91-98
8. Džimbeg-Malčić, Vesna; Barbarić-Mikočević, Željka; Itrić, Katarina, Kubelka-Munk Theory in Describing Optical Properties of Paper (I). // Tehnički Vjesnik -Technical Gazette. 18 (2011) , 1; 117-124

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Research project associate on the following projects, financed by the Ministry of Science, Education and Sports:

1. Slama pšenoraži kao izvor vlakanaca u proizvodnji novinskog papira, ac. Year 2013/2014,
2. Slama žitarica kao izvor primarnih vlakanaca u proizvodnji novinskog papira, ac. god. 2014/2015
3. Utjecaj ne-drvnih vlakanaca na kemijsku stabilnost grafičkog proizvoda, ac. year 2015/2016.

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Teacher 2

Name and Surname Damir Modrić, assistant professor

E-mail: damir.modric@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Assistant professor Damir Modrić, born in 1957, teaches several courses of physics in graphic technology at the Faculty of Graphic Arts in Zagreb. He is the author of more than 40 scientific and professional papers in the field of physics in graphic technology. The focus of his interest, in the context of hypotheses and research objectives, are concepts related to the theory of radiative transfer and the interaction of radiation with the system paper – printing ink, which disperses and absorbs light, using a stochastic model based on the Monte Carlo method and its application in the printing industry. He is a member of several scientific committees of international scientific conferences and is one of the chief editors of the scientific journal Acta Graphica.
Since 2014 he is the lecturer of the course "Quantitative Methods" at the University North.

Date of last academic appointment to the teaching and research position: 6. September 2010

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. D.Keček, D.Modrić, M.Stojić: VJEROJATNOST I STATISTIKA, University North, 2012 ; ISBN: 978-953-7809-11-9
2. Damir Modrić; Katja Petric Maretić; Marin Milković. Modeling light dispersion in the printing substrate within the Monte Carlo method. // Tehnički vjesnik : znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. 19 (2012) , 1; 77-81 (SCI - Expanded) (if – 0,615).
3. Damir Modrić, Katja Petric Maretić and Aleš Hladnik. Modeling spatial reflection from an uncoated printing paper using Monte Carlo simulation. // Nordic Pulp & Paper Research Journal. Volume 27 (2012) , Issue No. 5; 968-975 (CC) (if – 1,071)
4. K. Petric Maretić; M. Milković; D. Modrić: Akaike information criterion in the edge analysis of the screen element // Tehnički vjesnik: znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. 20 (2013), 3; 441-447 (SCI - Expanded) (if – 0,615).
5. K. Hajdek; P. Miljković; D. Modrić: Some aspects of modeling of line screen element reflectance profile within the Monte Carlo method. // Tehnički vjesnik: znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. Vol.21 No.4 (2014); 779-788 (SCI - Expanded) (if – 0,615).
6. Modrić, Damir; Petric Maretić, Katja; Hladnik, Aleš: Determination of point-spread function of paper substrate based on light-scattering simulation. // Applied Optics. 53 (2014) , 33; 7854-7862 (CC) (if – 1,649)

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Project associate on the project 128-1281955-1960 "Evaluacija kvantitavnih i kvalitativnih kriterija procesa grafičke reprodukcije" financed by the Ministry of Science, Education and Sports (2007 – 2013).
2. Project associate on the project financed by the Croatian science foundation IP-2014-09-1218 „Definiranje mogućnosti uporabe mini dentalnih implantata (MDI) i njihovi rezultati u in vitro i u kliničkim prospektivnim istraživanjima" (2015-2019).

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 2

Course

Name of Course: **PHYSICAL AND CHEMICAL PROPERTIES OF POLYMERIC MATERIALS**

Code: **PDS 205**

Semester: II. Semester – Graphic engineering

Teacher: Marica Ivanković, full professor

Course Summary

Foundations of the physical chemistry of polymers: Structure and properties of polymer molecules. Configurations and conformations. Polydispersity. Molecular weight distribution. Statistic functions of the molecular weight distribution. Molecular weight averages. Polymer solutions. Types of interaction polymer – solvent. Criteria of solubility. Parameters of solubility. Kinetics of swelling and dissolution. Viscosity of polymer solutions. Thermodynamics of polymer solutions. Theories of polymer solutions. Phase separations and balances in polymer systems. Polymer materials: polymer blends. Thermodynamics of polymer blends. Phase diagrams. Modification of the polymer bordering surface/ polymer. Polymer liquid crystals. Polymer compositions: Polymer compositions in the selection of materials. Matrices. Fillers. Reinforcements. Polymer bordering surface/ filler (reinforcement). Modification of the polymer bordering surface/ filler (reinforcement). Polymer nanocompositions. Preparation of the nanocompositions. Organic – anorganic hybrids. Application of polymers and polymer compositions.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to evaluate new facts, concepts, procedures, principles and theories in the field of scientific research of polymer materials
- advanced, highly specialized knowledge and skills necessary for the acquisition of new knowledge in the field of polymer materials
- competence to create and evaluate new polymer materials
- skills to manage scientific research activities
- social responsibility and commitment to successful implementation of research conducted

Description of teaching methods:

Lectures

Compulsory literature:

1. L. H. Sperling, L. H., (2001), Introduction to Physical Polymer Science, 3rd ed., New York: John Wiley & Sons
2. Ivanković, M., (2007), Polimerni nanokompoziti, Polimeri, 28 (3) 156-167.
3. E. Oberšmit, (1985) Nauka o konstruiranju, metodičko konstruiranje i konstruiranje pomoću računala, FSB, Zagreb,

Additional literature:

1. Barth, H. G., Mays, J. W., (1991), Modern Methods of Polymer Characterization, , New York: John Wiley & Sons.

Number of lectures: 30

ECTS: 7

Teaching quality control:

seminar paper, oral exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Marica Ivanković, full professor

E-mail: mivank@fkit.hr

Work institution: Faculty of chemical engineering and technology, University of Zagreb

Short CV:

Marica Ivanković graduated in 1985 and earned her Master's degree in 1988 from the Faculty of Technology, University of Zagreb. She received her PhD in 1994 at the Faculty of Chemical Engineering and Technology (FKIT) in Zagreb with the thesis « Curing kinetics and chemorheology of thermoset matrices for composites» . From 1991 to 1993 she stayed at the Università degli Studi di Napoli, Naples, Italy. In 1995 she was appointed assistant professor at FKIT, associate professor in 2000, full professor in 2005 and full professor with tenure in 2010, in the discipline of engineering sciences, field: chemical engineering and other basic engineering sciences, branch: materials. In the FKIT doctoral program „Engineering Chemistry" she was assigned to teach the Physical and Chemical Principles in Polymeric Systems (from 2004 to date) and Composite Materials (from 2004 to date). She has taught the course „Polymeric Materials" in the doctoral program „Graphic Engineering and Graphic Design" of the Faculty of Graphic Arts, University of Zagreb. Her scientific interests include hydrodynamic and thermodynamic properties of polymeric solutions, kinetics of polymerization reactions, chemorheology of duroplasts and duroplast composites, interpenetrated polymeric nets, organic-anorganic hybrides and polymeric nanocomposites. She has published 60 scientific papers, 25 of which were referred to in international databases. (SCI: 391 citation, h-index: 11).).

Date of last academic appointment to the teaching and research position: December 21th 2010

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Rogina, A., Ivanković, M., Ivanković, H., (2013) Preparation and characterization of nano hydroxyapatite within chitosan matrix, Materials Science and Engineering C, 33 (8), 4539-4544.
2. Huskić, M., Žigon, M., Ivanković, M., (2013) Comparison of the properties of clay polymer nanocomposites prepared by montmorillonites modified by silane and by quaternary ammonium salts, Applied Clay Science, 85, 109-115.

3. Milovac, D., Gallego Ferrer, G., Ivanković, M., Ivanković, H., (2014), PCL-coated hydroxyapatite scaffold derived from cuttlefish bone: morphology, mechanical properties and bioactivity, Materials Science and Engineering C, 34 , 437-445.
4. Milovac, D., Gamboa-Martinez,T.C., Ivanković, M., Gallego Ferrer, G., Ivanković, H., (2014) PCL-coated hydroxyapatite scaffold derived from cuttlefish bone: In vitro cell culture studies, Materials Science and Engineering C, 42, 264-272.
5. Rogina, A., Rico, P., Gallego Ferrer, G., Ivanković, M., Ivanković, H., (2015), Effect of in situ formed hydroxyapatite on microstructure of freeze-gelled chitosan-based biocomposite scaffolds, European Polymer Journal, 68, 278-287.
6. Rogina, A., Rico, P., Gallego Ferrer, G., Ivanković, M., Ivanković, H., (2015) In situ hydroxyapatite content affects the cell differentiation on porous chitosan/hydroxyapatite scaffolds, Annals of Biomedical Engineering, in press ; DOI: 10.1007/s10439-015-1418-0.
7. Ivanković, M., (2011), Nanomaterijali i nanoproizvodi-mogućnosti i rizici, Polimeri, 32 (1), 23-28.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Biokeramički, polimerni i kompozitni nanostrukturirani materijali

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 2

Course

Name of Course: **INFORMATION SECURITY IN PRINTING**

Code: **PDS 207**

Semester: II. Semester – Graphic engineering

Name and Surname Antun Koren, full professor

Course Summary

Creating modules for digital information in all forms of protecting the visual image of the printing forms. Calculation of the loss of information in an information channel as a destructive phenomenon while forming input and output information. Organisation of print protection in graphic prepress, postpress and printing, including internet printing. Secret protection parameters.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- advanced knowledge in the field of information security in printing
- specialized skills and techniques necessary for critical problem solving by means of innovative approaches
- independence, scientific and professional integrity

Description of teaching methods:

Lectures and submission of a seminar paper.

Compulsory literature:

1. R. Elliot et al, Information Security in Higher Education. Professional Paper Series, Cause, Boulder, 1999.
2. M.J. Chick, Integrating Automated Information Security and Information Resources Management Review, 5(1998)3.
3. B. Gates: Poslovanje brzinom misli-uporaba digitalnog nervnog sustava, Izvori, Zagreb 1999.

Additional literature:

Number of lectures: 15

ECTS: 4

Teaching quality control:

Tutorials and lectures

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Antun Koren, full professor

E-mail: antun.koren@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Antun Koren, PhD was born on 21 August 1951 in Zagreb. He completed his elementary and high school in Zagreb where he graduated in 1976 at the School centre for mechanical engineering and electrical engineering. In 1978, se graduated at the College for internal affairs in Zagreb. He completed his graduate study at the Faculty of Political Sciences in Zagreb in 1983, and he completes his postgraduate study at the Faculty of Political Sciences in Zagreb in 1986. At the Faculty of Organisation and Informatics in Varaždin, he defended his doctoral dissertation in 1995, titled „Protection of information in graphic industry of Croatia", which earned him a PhD degree in informational sciences.

Since 1984 to 1987 he worked in education at the educational centre of MUP RH and at the Railways educational centre.

Since 1987 he has been working as lecturer at the Faculty of Graphic Arts in Zagreb.

In addition to teaching, Antun Koren, PhD, has been active in scientific research as well. The area of his interest is primarily directed to information and its transponing by graphic methods and processes with emphasis to its protection from destruction occurrences.

From 1992 he participated in the Homeland war as an auxiliary group of MUP RH in the activities of managing security at the Croatian Printing Institute in Zagreb. He was awarded a testimonial of Homeland war.

Date of last academic appointment to the teaching and research position: Marth 16th 2011

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Ivan Dunđer, Antun Koren, Tibor Skala, Reinženjeringom poslovnih procesa do optimirane poslovne tehnologije i modela informacijskog sustava, International conferences PRINTING & DESIGN 2013. http://www.tiskarstvo.net/printing&design2013/clanciWeb/Dunder/Dunder.html
2. Antun Koren, Multimedijska primjena aktivnog 3D skeniranja temeljenog na 3D termografskom sustavu, International conference on Printing, Design and Graphic Communications "Blaž Baromić"
3. , 2013. http://www.pdc-conference.com/images/Program%20BB%20%20PDC%202013.pdf
4. Antun Koren, Stjepan Petrač, Korištenje hibridnih dokumenata zaštićenih novim tehnologijama, International conferences PRINTING & DESIGN 2014 http://www.tiskarstvo.net/printing&design2014/

Member of scientific and review committee of the International scientific conference "Printing & Design http://www.tiskarstvo.net/printing&design2014/HR_organizacija.html

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **PACKAGING MATERIALS**

Code: **PDS 208**

Semester: II. Semester - Graphic engineering

Teacher: Sonja Jamnicki, assistant professor

Course Summary

Wood - basic principles and types. Chemical composition of wood. Hydrocarbons: cellulose, hemicellulose, starch, pectin, water-soluble polysaccharides. Phenols, terpene, aliphatic acids, proteins and inorganic substances. Elemental composition of dry wood substance. Water in wood. Structure of wood. Grain elements. Properties of wood: (colour, gloss), smell, taste. Paper, paperboard, cardboard - basic principles, composition and production. Properties (general, mechanical, optical and chemical) and testing properties of paper and cardboard. The types of paper and cardboard for packaging. Paper box food packaging - parameters suitability for packing foods. Cellophane. Wood-free paper and cardboard. Paper and wood pulp and waste paper board. Corrugated cardboard. Types, properties and testing of corrugated cardboard. Glass. Chemical composition and structure of glass. Properties of glass. Viscosity and density, mechanical, thermal, electrical, optical and chemical properties of glass. Raw materials for the manufacture of glass. Glass production. Polymer materials. Polymers and polymeric materials. Modified and artificial polymers and polymeric materials. Production of polymers: polymerization, preparation and processing. Properties of polymer materials: mechanical, thermomechanical, chemical, optical and physiological. Types of polymers and polymer materials. Heavy-duty plastics: PE, PS, PP, PVC. Laminates. Types and properties of laminates. Production and use of laminates. Composite materials. Metals. Steel, tin, aluminium, tin. Properties of metals: physical, chemical, mechanical and physiological properties.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- specialized knowledge in the field of packaging materials
- specific competencies necessary for scientific research in the field of packaging materials competences to use modern scientific equipment to study packaging materials
- new specialized knowledge of characterization of materials and their properties

Description of teaching methods:

Lectures, tutorials (depending on the number of enrolled students)

Encouragement to independent research under the supervision of the teacher

Compulsory literature:

1. Emblem, A., Emblem, H. (Ed.) (2012) Packaging technology : fundamentals, materials and processes, Cambridge : Woodhead publishing.
2. Kirwan, M. J. (Ed.) (2013) Handbook of paper and paperboard packaging technology, 2nd Edition, Chichester : Wiley-Blackwell.

3. Wilson, L. A. (1997) What the printer should know about paper," 3rd Edition, Pittsburgh, PA: GATFPress.
4. Cakebread, D. (1993) Paper-Based Packaging. Leatherhead, UK: Pira International Ltd.
5. Bristow, J. A. (Ed.) (2001) Advances in Printing Science and Technology, Vol. 27, Advances in Paper and Board Performance, Leatherhead, UK: Pira International Ltd.
6. Thompson, B. (2004) Printing materials: Science and technology, Leatherhead, UK: Pira International Ltd.
7. Eldred, N. R. (2008) Package Printing, 2nd Edition, Pittsburgh : Printing Industries Press, 2008.

Additional literature:

1. Plackett, D. (2011) Biopolymers - new materials for sustainable films and coatings, Chichester: Wiley.
2. Vujković , I., Galić, K., Vereš, M. (2007) Ambalaža za pakiranje namirnica, Milijević, Drena (ur.) Zagreb: Tectus
3. Coles, R., McDowell, D., Kirwan M.J. (Ed) (2003) Food packaging technology, Oxford: Blackwell Publishing, CRC Press.
4. Barnes, K. A., Richard Sinclar, C., Watson, D. H. (2007) Chemical migration and food contact materials, Boca Raton ; Cambridge : CRC Press : Woodhead Publishing Limited
5. Katan, L. L. (1996) Migration from Food Contact Materials, London : Blackie Academic & Professional.

Number of lectures: 20

ECTS: 5

Teaching quality control:

Seminar assignments, research, scientific papers

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Sonja Jamnicki, assistant professor

E-mail: sjamnick@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Sonja Jamnicki received her PhD degree in 2011, at the Faculty of Graphic Arts, University of Zagreb. In her doctoral thesis "Suitability evaluation of different recovered paper grades for production of health safe food packaging", she has conducted detailed investigations concerning the types of chemical contaminants that can be present in different recycled paper and board grades and can negatively affect the health safety of the food packaging.

As a researcher she is currently involved in a bilateral scientific project "Treatments of fibre based Materials for Improved Food Packaging: IMPRO - FOOD - PACK" established between TU Dresden, Germany and Faculty of Graphic Arts, University of Zagreb, Croatia.
She is currently employed as assistant professor at the Department for materials in printing technology at the Faculty of Graphic Arts, University of Zagreb.

Date of last academic appointment to the teaching and research position: 20. May 2013

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Jamnicki, S., Handke, T., Härting, M., Lozo, B., Jakovljević, M. (2015). Deinking possibilities in the reduction of mineral oil hydrocarbons from recovered paper grades. Cellulose chemistry and technology, 49(7-8), 677-684.
2. Rožić, M., Kulčar, R., Jamnicki, S., Lozo, B., Gregor-Svetec, D. (2015). The UV stability of thermochromic ink on paper containing clinoptilolite tuff as a filler. Cellulose chemistry and technology, 49(7-8), 693-699.
3. Zakowska, H., Ganczewski, G., Johansson, C., Sanchez, C., Bobu, E., Schoukens, G., Johansson, K., Jamnicki, S. (2014). Packaging carbon footprint. Opakowanie, 55(10), 77-80.
4. Müller, G., Hanecker, E., Blasius, K., Seidemann, C., Tempel, L., Sadocco, P., Ferreira Pozo, B., Boulougouris, G., Lozo, B., Jamnicki, S., Bobu, E. (2014). End-of-Life Solutions for Fibre and Bio-Based Packaging Materials in Europe. Packaging technology and science, 27(1), 1-15.
5. Jamnicki, S., Barušić, L., Lajić, B. (2013). Suitability evaluation of various recycled paper grades for the production of health safe food packaging, Technics Technologies Education Management-TTEM, 8(1), 70-77.
6. Jamnicki, S., Majnarić, I., Mirković, I. B. (2012). Office Print-Outs in the Production of Recycled Food Packaging Paper. In 23rd DAAAM International Symposium on Intelligent Manufacturing and Automation.
7. Jamnicki, S., Lozo, B., Rutar, V., Barušić, L. (2012). A study on the food contact suitability of recycled paper and board. Research Development, Technology. Papíripar, 54(4), 14-20
8. Jamnicki, S., Lozo, B. (2012). The suitability of using recycled paper as a direct food packaging. Celuloză şi Hârtie, 61(4), 3-9.
9. Jamnicki, S., Lozo, B., Rutar, V. (2011). Packaging made from recycled paper and board: evaluation of the suitability for direct food contact. In Proceedings of the 2nd International Joint Conference on Environmental and Light Industry

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

International scientific projects:

1. COST Action FP 1003 "Impact of Renewable Materials in Packaging for Sustainability - Development of Renewable Fibre and Bio-Based Materials for New Packaging Applications", research project manager:

Kennert Johansson; Croatian MC Substitute member; since 2014 Head of the working group 3 "End-of-Life" (WG3 Manager).

2. Research project associate in the bilateral scientific project "New graphic applications with chromogenic printing inks", Croatian partner: Faculty of Graphic Arts, research project manager: full professor Branka Lozo; Slovenian partner, National Institute of Chemistry, Slovenia, research project manager: assistant professor Marta Klanjšek Gunde
3. Research project associate in the bilateral scientific project "Treatments of Fiber-based Materials for Improved Food Packaging", Croatian partner: Faculty of Graphic Arts, research project manager: full professor Branka Lozo; Geraman partner: TU Dresden, research project manager: Professor Harald Grossmann
4. Croatian MC member COST Action FP 1405 "Active and intelligent fibre-based packaging - innovation and market introduction", research project manager: Sanne Tiekstra.

National scientific projects:

1. National scientific and research program of the Ministry of Science, Education and Sports "Inovativni grafički materijali", 128-0000000-3288, research project manager: full professor Branka Lozo
2. "Funkcionalne aplikacije termokromnim tiskarskim bojama", Research support program, research project manager: full professor
3. "Termokromne boje, stabilnost na svjetlu (molekularne promjene) i zdravstvena ispravnost", Research support program, research project manager: full professor Mirela Rožić
4. "Organsko recikliranje otpadnog papira i ambalažnog otpada",Research support program, research project manager: full professor Mirela Rožić

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **NON-DESTRUCTIVE MEASUREMENT METHODS IN PRINTING TECHNOLOGY**

Code: **PDS 209**

Semester: II. Semester - Graphic engineering

Teacher: Branka Lozo, full professor

Course Summary

The purpose of applying non-destructive measuring methods in graphic technology, examples of applications in the study of interaction of print materials: CCD camera and data processing using a programme for image analysis; Raman spectroscopy: basic measurements, depth measurement using the immersion method of sample preparation, construction of deep sections and interpretation; UV Raman and FTIR-PAS: surface and subsurface signals of solvable and pigmented dyes' prints on various printing substrates, meaning; CLSM, examples of measurements using the immersion method, orthogonal projection, 3D projection. Microscoping: SEM: sample preparation; BSE and SEI images, surface images and cross sections of prints; LM surface of prints, general AFM and ESCA guidelines. Control methods: LM microtome prints; FIB. Accompanying computer programs.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to evaluate new facts on the basis of scientific research
- skills to create procedures, principles and theories in the field of scientific research
- advanced, complex, original, highly specialized knowledge and skills
- ability to integrate different scientific areas

Description of teaching methods:

CCD Camera and image processing by the image analysis program; Raman Spectroscopy: basic measurements, in-deep-measurements of the samples prepared by means of the immersion technique, generation of depth profiles and its analysis; UV Raman and FTIR-PAS: signal capturing from the surface and below-surface areas of prints printed with dye- and pigment-based inks printed on different printing substrates, results and discussion; CLSM, measurements on the samples prepared by immersion-technique, orthogonal projections, 3D projections. Microscopy: SEM, sample preparation; BSE and SEI images; surface and cross section images of the prints; LM of print surfaces; general description of AFM and ESCA methodology; Control measurements: LM of microthomic sections of the prints, FIB.

Accompanying computer programs.

Compulsory literature:

1. Levlin, J-E; Grossmann, H; Read, B; Ervasti, I; Hooimeijer, A; Lozo, B; Sain-Armand, F. J.; Cochaux, A; Faul, A; Ringman, J; Stawicki, B; Bobu, E; Miranda, R; Blanco, A; Stanić, M. (2010) The Future of Paper Recycling in Europe: Opportunities and Limitations / Stawicki, B ; Read, B (ur.), Bury, Greater Manchester : PITA

2. Stanić, M; Lozo, B; Gregor Svetec, D. (2012) Colorimetric Properties and Stability of 3D Prints, Rapid prototyping journal. 18, (2); 120-128
3. Bogataj, U; Muck, T; Bračko, S; Lozo, B. (2010) Readability of Processed Ink-Jet and Laser-Printed 2D Codes, The Journal of imaging science and technology. 54, 3; 030502-1-6
4. Lozo, B; Vyorykka, J; Vuorinen, T; Muck, T. (2006) Non-destructive microscopic and spectroscopic methods for depth profiling of Ink Jet prints, Journal for Imaging science and technology. 50, (4); 333-340

Additional literature:

1. Lozo, B; Stanić, M. (2010) 3D Ink Jet Printing / Stasiak W. J. (ur.). Sprinfield : Society for Imaging Science and Technology
2. Lozo, B. (2010) A Short History of Paper - The Book of Paper / Helfrich, O ; Peters, A (ur.). Rotterdam : Post Editions

Number of lectures: 20

ECTS: 5

Teaching quality control:

Determining the topic of the research study, supervision and review of the final paper

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Branka Lozo, full professor

E-mail: blozo@grf.hr

Work institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Born on November 1st, 1961 in Zagreb, maiden name: Vodopija

Education:

Classical Gymnasium in Zagreb, year of graduation: 1980, foreign languages: English, Italian, French

Faculty of Graphic Arts University of Zagreb, year of graduation: 1986, Rector's Award in 1985, completed Master's degree, entitled: Contribution to paper quality optimization, supervisors: A. Golubović I Z. Bolanča, completed doctoral thesis in 2005: ''The stability of Ink Jet prints studied by non-destructive methods", supervisors: T. Muck I N. Knešaurek

Work experience and appointments to teaching and research positions:

Assistant and senior assistant until 2006, assistant professor until 2011, associate professor, full professor

Appointments to science positions:

Research associate in 2006, senior research associate in 2010, research fellow in 2011.

Scientist's Identification Number and bibliography: 172126,

http://bib.irb.hr/mzos/lista-radova?autor=172126

Training programs:

Helsinki University of Technology: Raman i UV Raman spectroscopy, FTIR 2005.

Norwegian University of Technology and Science, Trondheim: SEM i LM, microscopy, 2005.Faculty of Natural Sciences and Engineering of the University of Ljubljana, Slovenia: 3D InkJet Printing, academic year 2006/2007

Centre Technique du Papier, Grenoble: Deinking floatation of flexo and flexo-improved prints, ERIC, 2006

Faculty of Natural Sciences and Engineering of the University of Ljubljana, Slovenia: Chromogenic colour print

Research project manager in the following projects:

National project, Ministry of science, education and sports (MZOS): Innovative graphic materials, 2008/13

Bilateral project, Croatian-German: Treatments of Fibre-based Materials for Improved Food Packaging, 2013

Bilateral Slovenian- Croatian project, New graphic applications with chromogenic printing inks, 2011/12. ac. year

Grant holder for the Faculty of Graphic arts for Cost FP 1104 New possibilities for print media and packaging - combining print with digital, 2012/16. ac. Year

Other international projects:

Croatian coordinator at Cost FP 1003: Impact of renewable materials in packaging for sustainability – Development of renewable fibre and bio-based materials for new packaging applications, 2010/2014.

Cost E48: The Limits of Paper Recycling, 2004/2008

Cost E46: Improvements in the Understanding and Use of De-inking Technology, 2004/2008

Cost E32: Characterisation of Paper Surfaces for Improved Paper Grades, 2003/2007

Teaching:

Undergraduate, graduate and postgraduate study at the Faculty of Graphic Arts University of Zagreb, courses taught in Croatian and English. She was supported by the University of Zagreb for delivery of The History of Printing course in a foreign language in 2011; currently acting as a supervisor at the Faculty of Natural Sciences and Engineering of the University of Ljubljana, Slovenia

Supervisions of completed doctoral thesis:

M. Stanić, 2010, first doctoral thesis written and completed in English language at the Faculty of Graphic Arts

S. Jamnicki, 2001

Memberships and duties:

Principal committee for the discipline of engineering sciences – field of chemical engineering, mining, oil and geological engineering, metallurgy, textile technology and graphic technology, 2013/2017.

Board of Directors at European Fiber and Paper Research Organisation, EFPRO, 2012/2015

Croatian standards institute, Technical committee 6 for paper and pulp

CEN - European Committee for Standardisation TC 172

The Society for Imaging Science and Technology, USA

Project reviews for European Science Foundation, 2010

Editorial board of journal Celluloza si Hartie, Braila, Romania

Editorial board of journal Acta Graphica, Zagreb, Croatia

Publication Chair of NIP/DF Conference, Seattle, Washington, 2013
Program Chair for Special papers of NIP/DF Conference, Quebec, Canada, 2012
Program Chair for Europe and Middle East of NIP/DF Conference, Minneapolis, Minnesota, 2011
Organisation for guest lecturer Mr Steve Simske HP Labs, USA at the Faculty of Graphic Arts, 2012
Organisation of international PhD student workshop: COST Training school: New Technologies for treatments in the end-of-use of packaging materials, Faculty of Graphic Arts, 2011
Organisational board of International workshop COST Strategic Workshop: The Future Needs of the Paper Industry, in the framework of CEPI Paper Week, Brussels, Belgium, 2009
Organisation of INGEDE seminar and lecture by Mr Andreas Faul at the Faculty of Graphic Arts in Zagreb, 2008
Organisation of bilateral Croatian-Slovenian student seminar: Zero.99 Non-Stop Student Seminar at the Faculty of Graphic Arts, 2008
Organisation of presentation of 3D Ink Jet print Z-Corp i Ib-Procadd d.d. , Zagreb, Mimara Museum, 2007
Organisation of COST E48 The Limits of Paper Recycling project conference, Zagreb, Hotel Palace, 2006

Date of last academic appointment to the teaching and research position: July 21th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Rožić, M.; Kulčar, R.; Jamnicki, S.; Lozo, B.; Gregor-Svetec, D. (2015), The UV stability of thermochromic ink on paper containing clinoptilolite tuff as a filler, Cellulose chemistry and technology. 49, 7-8; 693-699
2. Jamnicki, S; Handke, T; Härting, M; Lozo, B; Jakovljević, M. (2015), Deinking possibilities in the reduction of mineral oil hydrocarbons from recovered paper grades, Cellulose chemistry and technology. 49, 7-8; 677-684.
3. Müller, G; Hanecker, E; Blasius, K; Seidemann, C; Tempel, L; Sadocco, P; Ferreira Pozo, B; Boulougouris, G; Lozo, B; Jamnicki, S; Bobu, E. (2014), End-of-Life Solutions for Fibre and Bio-Based Packaging Materials in Europe, Packaging technology and science. 27, 1; 1-15
4. Stanić, M; Lozo, B; Gregor Svetec, D. (2012), Colorimetric Properties and Stability of 3D Prints, Rapid prototyping journal. 18, 2; 120-128
5. Gregor-Svetec, D; Rožić, M; Muck, T; Lozo, B. (2012), Natural zeolite as a filler in the base ink jet paper sheet, Nordic pulp & paper research journal. 27, 4; 721-728
6. Lozo, B. (editor). (2011) New Technologies for treatments in the end-of-use of packaging materials, Zagreb, Faculty of Graphic, University of Zagreb, (proceedings)
7. Jamnicki, S; Lozo, B. (2012) The suitability of using recycled paper as a direct food packaging, Celuloză şi Hârtie. 61, (4); 3-9
8. Jamnicki, S; Lozo, B; Rutar, V; Barušić, L. (2012) A study on the food contact suitability of recycled paper and board, Papíripar. 54, (4); 14-20
9. Bogataj, U; Muck, T; Lozo, B; Zitnik, A. (2011) Readability of multi-coloured 2D codes, Technics Technologies Education Management. 6, (3); 622-630

10. Lozo, B. (2014) NIP/Digital Fabrication: A Week of Printing Technology in Review, IS&T Reporter. 29, (4); 3-5
11. Hadžić, M; Lozo, B. (2011) Povijesni pregled razvoja riječke tvornice papira, Drvna industrija, vol. 62, (2); 147-152

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Project management:

National scientific and research program of the Ministry of Science, Education and Sports

1. „Inovativni grafički materijali", 2008 - 2013
2. Bilateral German-Croatian: "Treatments of Fiber-based Materials for Improved Food Packaging", 2013
3. Bilateral Slovenian-Croatian: "New graphic applications with chromogenic printing inks", 2011/12
4. Grant holder for the Faculty of Graphic Arts for Cost FP 1104 "New possibilities for print media and packaging- combining print with digital, 2012/16. god.

Other international projects:

1. Croatian coordinator (collaboration with assistant professor Sonja Jamnicki) for Cost FP 1405;
2. Croatian coordinator in Cost FP 1003: Impact of renewable materials in packaging for sustainability – Development of renewable fibre and bio-based materials for new packaging applications, 2010/14. god

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 2

Course

Name of Course: **INTERACTION OF PRINT MATERIALS**

Code: **PDS 210**

Semester: II. Semester - Graphic engineering

Teacher: Tadeja Muck, full professor

Course Summary

Introduction of modern methods for better understanding the interactions as well as more relevant analysis of the surface of the printing material (dynamics of liquid penetration – PAD, dynamic wetting angle – DAT, photoacoustic spectroscopy – PAS, confocal laser scanning microscopy – CLSM, atomic force microscopy – AFM, stereo photometry, laser profilometry, microtomy, etc.). Detailed familiarising with the interactions in newer, digital printing methods: ink-jet (IJ) and other types of digital printers for industrial, office and home use: properties of the printing ink (colorant type: dye pigment, solvent type (water, organic solvent)) and printing material (roughness, surface treatment – coating with pigments, porosity of nano-coating...). Durability of print (mechanical, optical, waterproof...), dependence on the energy of adhesion of the dye to the paper. Influence of the electronic charge of the black and influence of the surface cartridge of the printing material on the interactions and final print quality. Various forms of interactions (e.g. electrostatic or ionic interactions, π-π interactions, hydrophobic interactions, dipole-dipole interactions, covalent bonds, hydrogen bonds and van der Waals bonds). Mathematical methods for adequate characterisation of the paper sample and objective determining of the print quality with an emphasis on procedures of visual processing of the print. Negative effects (wicking, bleeding, mottling). Various devices and procedures for collecting data (photography, print...), (CCD camera, optical reader, microscope), dependence of the final result on the precision of the device used. Ways of image processing (by means of morphological transformations, spatial filters).

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- mastering instrumental methods, allowing an objective assessment of the interaction with crucial importance for achieving the highest level of print quality
- profound knowledge of methods for processing and analysing images, enabling objective assessment of print quality
- familiarization with software tools for creating macros and plugins enabling objective evaluation or analysis

Description of teaching methods:

Teaching in the form of lectures and seminar papers written by students.

Compulsory literature:

1. Gonzalez, Woods, and Eddins. Digital Image Processing Using MATLAB 2nd Ed., 2009.
2. Hladnik, Muck. Obdelava digitalnih slik v grafiki. [Del 1, Osnove]. 1. izd. Ljubljana: Naravoslovnotehniška fakulteta, Oddelek za tekstilstvo, 2010.

3. Muck, Križanovskij. 3D-tisk : [--- tehnologije 3D-tiska, priprava 3D-modelov za tisk, pojmovnik ---]. 1. izd. Ljubljana: Pasadena, 2015. 221 str., ilustr.
4. Leng. Materials Characterization: Introduction to Microscopic and Spectroscopic Methods, 2nd Edition, ISBN: 978-3-527-33463-6 392 pages, September 2013.

Additional literature:

1. Shaoxia Wang; Surface characterization of chemically modified fiber, wood and paper, ISBN 978-952-12-3038-7
2. Doctoral Thesis, Laboratory of Paper Coating and Converting Department of Chemical Engineering, Centre for Functional Materials, 2014

Number of lectures: 30

ECTS: 7

Teaching quality control:

Tutorials

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Tadeja Muck, full professor

E-mail: tadeja.muck@ntf.uni-lj.si

Work institution: University of Ljubljana, Faculty of natural sciences and engineering, Department of textiles, graphic arts and design, Snežniška 5, Ljubljana

Short CV:

Associate professor Tadeja Muck, PhD, was born on 5 May 1971 in Brežice. She completed her elementary school in Sevnica and her high school in Celje in 1989. In the same year, she was admitted to the Department of Chemical Technology at the Faculty of Natural Sciences and Engineering of the University of Ljubljana, Slovenia, where she graduated in 1984. She completed her postgraduate study in paper restoration at the Faculty of Biotechnology, having defended her Master thesis in 1998. In 2002 she defended her doctoral thesis entitled "Interactions on paper surface with drop printing" at the Faculty of Natural Sciences and Engineering, Department of Graphic and Information Technology.

In 2003, she was appointed assistant professor.

Upon completing her studies, she spent one year working at the factory "Radeče papir" at the development of waterproof packaging. From 1996 to 1998 she was a researcher at the Slovenian Scientific Foundation, participating in the project "Sinteza stilbenskog crnila sa polistilbena smrekove skore". Until 1999 she worked as research assistant at the Faculty of Biotechnology, Department of Wood Chemistry. In the same year, she started working at the Institute for cellulose and paper in Ljubljana where she started working as senior researcher II after the completion of her doctoral study. She was also a postdoctoral research project manager: Development

method for typographic paper analysis. Since 2004, she has been working at Faculty of Natural Sciences and Engineering, Department of Graphic and Information Technology as a lecturer in the field of: Graphic processes technology and standardisation, colour management and interactive media.
Her area of scientific research is investigation of interactions in print, printed electronics and image processing.

Date of last academic appointment to the teaching and research position: March 25th 2014

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Scientific papers:

1. GREGOR-SVETEC, Diana, PIVAR, Matej, MUCK, Tadeja. Properties of recycled papers important for printable antennas. Cellulose chemistry and technology, ISSN 0576-9787, 2015, vol. 49, no. 7/8, str. 701-708, ilustr.
2. ĐOKIĆ, Miloje, RADONIĆ, Vasa, PLETERŠEK, Anton, KAVČIČ, Urška, CRNOJEVIĆ-BENGIN, Vesna, MUCK, Tadeja. Comparison between the characteristics of screen and flexographic printing for RFID applications = Primerjanje lastnosti sito in fleksotiska za aplikacije RFID. Informacije MIDEM, ISSN 0352-9045, mar. 2015, letn. 45, št. 1, str. 3-11, ilustr.
3. KAVČIČ, Urška, MAČEK, Marijan, MUCK, Tadeja. Ultra-high frequency radio frequency identification tag antennas printed directly onto cardboard used for the manufacture of pharmaceutical packaging. Journal of imaging science and technology, ISSN 1062-3701, Sep. 2015, vol. 59, no. 5, str. 50504/1-50504/8, ilustr.
4. MAJNARIĆ, Igor, HLADNIK, Aleš, MUCK, Tadeja, BOLANČA-MIRKOVIĆ, Ivana. The influence of ink concentration and layer thickness on yellow colour reproduction in liquid electrophotography toner = Utjecaj koncentracije bojila i debljine nanosa žute na kolornu reprodukciju s tekućim elektrofotografskim tonerom. Tehnički vjesnik, ISSN 1330-3651, 2015, vol. 22, no. 1, str. 145-149.
5. MUCK, Tadeja, MAUKO PRANJIĆ, Alenka, GREGOR-SVETEC, Diana. UV Ink-Jet printability and durability of stone and foil. JGED, ISSN 2217-379X, 2014, vol. 5, no. 1, str. 7-12, ilustr.
6. KAVČIČ, Urška, PIVAR, Matej, ĐOKIĆ, Miloje, GREGOR-SVETEC, Diana, PAVLOVIČ, Leon, MUCK, Tadeja. UHF RFID tags with printed antennas on recycled papers and cardboards = UHF RIFD-značke z natisnjenimi antenami na recikliranem papirju in kartonu. Materiali in tehnologije, ISSN 1580-2949. [Tiskana izd.], mar.-apr. 2014, letn. 48, št. 2, str. 261-267.
7. ĐOKIĆ, Miloje, RADONIĆ, Vasa, MLADENOVIČ, Vladan, PLETERŠEK, Anton, KAVČIČ, Urška, HLADNIK, Aleš, CRNOJEVIĆ-BENGIN, Vesna, MUCK, Tadeja. The influence of lamination and conductive printing inks on smart-card operability = Vpliv laminacije in prevodnih tiskarskih barv na delovanje pametnih kartic. Materiali in tehnologije, ISSN 1580-2949. [Tiskana izd.], jul.-avg. 2014, letn. 48, št. 4, str. 497-504.
8. MRAOVIĆ, Matija, MUCK, Tadeja, PIVAR, Matej, TRONTELJ, Janez, PLETERŠEK, Anton. Humidity sensors printed on recycled paper and cardboard. Sensors, ISSN 1424-8220, Aug. 2014, vol. 14, no. 8, str. 13628-13643, ilustr.

9. HVALA, Bojana, SIMONČIČ, Barbara, MUCK, Tadeja. Vpliv prisotnosti apreture in vode na delovanje pasivnih značk UHF RFID na različnih tkaninah = Influence of finishing and water on functioning of passive UHF RFID tags on different fabrics. Tekstilec, ISSN 0351-3386, 2014, vol. 57, no. 2, str. 153-163, ilustr.
10. KAVČIČ, Urška, PAVLOVIČ, Leon, PIVAR, Matej, ĐOKIĆ, Miloje, BATAGELJ, Boštjan, MUCK, Tadeja. Printed electronics on recycled paper and cardboards = Tiskana elektronika na recikliranem papirju in kartonu. Informacije MIDEM, ISSN 0352-9045, mar. 2013, vol. 43, no. 1, str. 50-57, ilustr.
11. HLADNIK, Aleš, MUCK, Tadeja, STANIĆ, Maja, ČERNIČ, Marjeta. Fast Fourier transform in papermaking and printing: two application examples. Acta polytechnica Hungarica, ISSN 1785-8860, 2012, vol. 9, no. 5, str. 155-166.
12. PAVLOVIĆ, Živko, MUCK, Tadeja, HLADNIK, Aleš, KARLOVIĆ, Igor. A comparative study of offset plate quality parameters using image processing and analytical methods. Acta polytechnica Hungarica, ISSN 1785-8860, 2012, vol. 9, no. 6, str. 181-193.
13. 1KÖNIG, Silva, GREGOR-SVETEC, Diana, HLADNIK, Aleš, MUCK, Tadeja. Assesing the lightfastness of prints by image chrominance histogram quantification. Journal of imaging science and technology, ISSN 1062-3701, Nov./Dec. 2012, vol. 56, no. 6, str. 060507/1-060507/7, ilustr.
14. GREGOR-SVETEC, Diana, ROŽIĆ, Mirela, MUCK, Tadeja, LOZO, Branka. Natural zeolite as filler in base ink jet paper sheet. Nordic pulp & paper research journal, ISSN 0283-2631. [Print ed.], 2012, vol. 27, no. 4, str. 721-728.
15. KÖNIG, Silva, MUCK, Tadeja, GREGOR-SVETEC, Diana. The ageing resistance of offset and electrophotographic prints. Nordic pulp & paper research journal, ISSN 0283-2631. [Print ed.], 2012, vol. 27, no. 4, str. 739-749.
16. KAVČIČ, Urška, MAČEK, Marijan, MUCK, Tadeja, KLANJŠEK GUNDE, Marta. Readability and modulated signal strength of two different ultra-high frequency radio frequency identification tags on different packaging. Packaging technology & science, ISSN 0894-3214, 2012, vol. 25, iss. 7, str. 373-384, ilustr.
17. STAREŠINIČ, Marica, MUCK, Tadeja, STANIĆ, Maja, KLANJŠEK GUNDE, Marta. Development of image analysis procedures for evaluation of printed electronics quality = Razvoj metod slikovne analize za oceno tiskovne prehodnosti tiskane elektronike. Informacije MIDEM, ISSN 0352-9045, mar. 2011, letn. 41, št. 1, str. 12-17.
18. KAVČIČ, Urška, MAČEK, Marijan, MUCK, Tadeja. Impact study of disturbance on readability of two similar UHF RFID tags. Informacije MIDEM, ISSN 0352-9045, sep. 2011, letn. 41, št. 3, str. 197-201.
19. KÖNIG, Silva, MUCK, Tadeja, HLADNIK, Aleš, GREGOR-SVETEC, Diana. Recycled papers in everyday office use. Nordic pulp & paper research journal, ISSN 0283-2631. [Print ed.], 2011, vol. 26, no. 3, str. 349-355, ilustr.
20. KAVČIČ, Urška, MUCK, Tadeja, LOZO, Branka, ŽITNIK, Arjana. Readability of multi-colored 2D codes. Technics tehnologies education management, ISSN 1840-1503, 2011, vol. 6, no. 3, str. 622-630, ilustr.

Faculty handbooks:

21. MUCK, Tadeja, KRIŽANOVSKIJ, Igor (avtor, ilustrator). 3D-tisk : [--- tehnologije 3D-tiska, priprava 3D-modelov za tisk, pojmovnik ---]. 1. izd. Ljubljana: Pasadena, 2015. 221 str., ilustr.
22. JAVORŠEK, Dejana, KARLOVIĆ, Igor, MUCK, Tadeja. Reproduciranje barv in barvno upravljanje. Ljubljana: Naravoslovnotehniška fakulteta, Oddelek za tekstilstvo, 2013. 275 str., ilustr.

Patents:

23. MRAOVIĆ, Matija, PIVAR, Matej, TOPLIŠEK, Tea, MUCK, Tadeja, PLETERŠEK, Anton. Tiskan frekvenčno selektivni zaslon : patent : SI 201400176 (A), 2015-11-30. Ljubljana: Urad RS za intelektualno lastnino, 2015. 6 str., ilustr. [COBISS.SI-ID 382656]
24. MRAOVIĆ, Matija, MUCK, Tadeja, PIVAR, Matej, ĐOKIĆ, Miloje, PLETERŠEK, Anton. Tiskan temperaturni senzor v pametni embalaži : patent : SI 24483 (A), 2015-03-31. Ljubljana: Urad RS za intelektualno lastnino, 2015. 6 str., ilustr. [COBISS.SI-ID 382912]
25. 2MUCK, Tadeja, KAVČIČ, Urška, MRAOVIĆ, Matija, MAČEK, Marijan, PLETERŠEK, Anton. Embalaža iz kartona z vgrajeno pametno značko za radiofrekvenčno identifikacijo z možnostjo beleženja različnih parametrov : patent št. SI 24272 z dne 31. 07. 2014. Ljubljana: Urad RS za intelektualno lastnino, 2014. 2, [9] str. [COBISS.SI-ID 3044720]

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. FPS COST Action FP1405, Active and intelligent fibre-based packaging – innovation and market introduction, 2014—2018
2. BI-RS/14-15-018, Razvoj metodeza uporabo komercialnega digitalnega fotoaparata kot naprave za merjenje barv, 1. 11. 2014 – 31. 12. 2015
3. FPS COST Action FP1104, New possibilities for print media and packaging - combining print with digital bio-based materials for new packaging applications, 2012—2016

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 2

Course

Name of Course: **GRAPHIC WEB TECHNOLOGIES**

Code: **PDS 212**

Semester: II. Semester-Graphic engineering

Teacher: Klaudio Pap, full professor

Course Summary

The course observes graphic languages that enable serving, receiving and processing of graphic objects on a web interface. The first thing analysed is XML technology and its derivatives DTD and XSD, XSL and XSLT which are necessary for development of graphic languages in web technology. Also defined are possibilities and tasks of graphic web languages SVG, VML and XSL-FO. Students will study drafting and grouping of graphic objects, making cut routes and masking paths, filter effects and creating graphic template. There will also be lectures on interactive web vector graphics and animation on web interface, dynamic creation of HTML and WML records as well as automatization of PDF documents production from the database. The course aims to develop knowledge of graphic web technologies and skills for their usage in the present day and future web interfaces.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- knowledge of graphic web technologies
- skills in the use of web technologies use and future web interfaces

Description of teaching methods:

Interactive lectures with elaborated bibliography content. Computer workshop.

Compulsory literature:

1. V. Žiljak, K. Pap: "PostScript",knjiga,Print &Publishing International Verlagsges m. b. H., Wien, 1999, ISBN: 3-9501090-0-5, http://free-zg.htnet.hr/kpap/
2. K. Pap: "Razvoj grafičkih jezika baziranih na XML-u", Tiskarstvo 03 ISBN 953-199-016-6, UDK 655(082), 655.4 : 004. 738.5, Zagreb, 2003. http://www.grf.hr/vziljak/tiskarstvo03/
3. 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, http://www.grf.hr/vziljak/tiskarstvo03/

Additional literature:

Number of lectures: 20

ECTS: 5

Teaching quality control:

Continuous knowledge assessment through seminars. Exams are taken by means of solving tasks on the computer as well as orally, to confirm the acquisition of the subject matter.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Klaudio Pap, full professor

E-mail: kpap@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Klaudio Pap, PhD, is full professor at the Faculty of Graphic Arts. He was born in 1963 in Zagreb. After finishing a high school program with special emphasis on mathematics he studied at the Faculty of Electrical Engineering, University of Zagreb and graduated from the Computing Techniques program in 1988. He earned his Master's degree in 1997 at Computing Sciences program at the same faculty, where he also received his doctoral degree in 2004. The same year he was appointed research associate at the University of Zagreb and assistant professor in the courses Computer Record and Computer Graphics. He has been an associate member of the Croatian Academy of Engineering since 2005, and became a senior research associate and associate professor at the University of Zagreb in 2010.

In his work he has been involved in research, development and application of computers in the area of computer graphics, image and text processing, computer models and simulations, web technology, digital printing and graphic programming languages.

He received the annual scientific award "Rikard Podhorsky" for 2010 from the Croatian Academy of Engineering and the National Award for Science for 2010, awarded by the Croatian Parliament. Together with his associates he received many gold medals for Infrared design innovation in Croatia and abroad.

He is the co-author of five (5) development products and six (6) software packages. He is the co-author of three (3) patents. He received the diamond award for digital printing in 1996 and more than fifty (50) international awards for the „INFRAREDESIGN®“ innovation.

In his early work he set up new models of mathematical pixel transformation which served as a basis for new computer graphics. By using new computer models and the PostScript programming language new possibilities in computer graphics were created and applied in RIP printing systems.

He has participated in the development of many new procedures in printed matter protection. In the security field of graphic technology he processed and created new grating methods. Algorithms that enable the joining of a grating element to every image element individually were proposed. Deformations of grating elements from low to maximum opacity were developed. In this way, completely new functions of growth of grating elements were set up. New hybrid grating methods based on basic amplitudinally modulated method were created, with stochastic change of angle, lines and form of the grating element.

He is the initiator of the project and scientific research of standards and creating digital scales of norms and communication dictionaries in the processes of publishing, graphic preparation, printing processes and processes of graphic finishing, integration of knowledge about norms and standards in graphic industry from different sources into a unique way of description in the form of an XML-document. He is involved in the research of workflows in graphic production and the creation of digital workflow bases, as well as the processes of continuous automatic production, operation processing and operation monitoring, and the optimisation of the process of graphic reproduction using the digital workflow base.

His research includes setting up new methods in printing that use the infrared part of the electromagnetic spectrum with the possibility of creating a double image and double information. Such research was recognized internationally, patents were filed and gold medals won around the world for innovation with real application.

Date of last academic appointment to the teaching and research position: May 19th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Scientific papers published in tertiary sources

1. V. Žiljak, K. Pap, I. Žiljak Stanimirović, “DEVELOPMENT OF A PROTOTYPE FOR ZRGB INFRAREDESIGN DEVICE”, Technical Gazette. Vol.18 No.2 (2011); No.1802-11
2. V. Žiljak, K. Pap, I. Žiljak Stanimirović, J. Žiljak Vujić, “Managing dual color properties with the Z-parameter in the visual and NIR spectrum”, Infrared Physics and Technology Vol.55. No.4, ISSN 1350-4495, Elsevier B.V., p: 326-336, (2012)
3. S. Brekalo, K. Pap, N. Stanić Loknar, "OPTIMISATION OF AUTOMATIC VARIABLE GRAPHIC LAYOUT AND IMPOSITION", Technical Gazette: Vol. 23 (2016) , 1; 91-98

Scientific papers published in secondary sources

1. S. Pavazza, K. Pap, „ The Alternative Way of Creating Infographics Using SVG Technology “, Acta Graphica 23 (2012.) ISSN 0353-4707 pp: 45-56, Zagreb
2. K. Pap, Jana Žiljak Vujić, Ulla Leiner Maksan, Vesna Uglješić: "Metoda izrade dualnog portreta na osobnim dokumentima", Polytechnic & Design, ISSN 1849-1995, Vol. 1, No. 1, 2013
3. S. Brekalo, K. Pap: "DIGITAL PREPRESS OPTIMISATION FOR VARIABLE DIGITAL PRINTING OF BARCODES BY USING SCRIPTING TECHNOLOGIES", Polytechnic & Design, ISSN 1849-1995, Vol. 3, No. 2, 2015.

Peer-reviewed scientific papers in proceedings of international conferences :

J. Ž. Vujić, K. Pap: SECURITY MARKING OF UNIFORMS AND DOCUMENTS IN VISUAL AND INFRARED SPECTRUM, INTERNATIONAL SCIENTIFIC AND PROFESSIONAL CONFERENCE “ NEW SECURITY THREATS AND CRITICAL NATIONAL INFRASTRUCTURE“ Zagreb, 12.–13. rujna 2013.

1. K.Pap, I. Ž. Stanimirović, M. Matas: „IRDMARK PROTECTION OF DOCUMENTS“, MEĐUNARODNA KONFERENCIJA PRINTING&DESIGN 2014, TERME TUHELJ
2. V. Žiljak, J. Ž. Vujić, D. Cafuta, K. Pap, I. Ž. Stanimirović, I. Dodig; MULTIMEDIA SYSTEM FOR VISUAL AND INFRARED SPECTRUM OF A NEW IDENTITY CARD, XXI. MEĐUNARODNI ZNANSTVENI SKUP, DRUŠTVO I TEHNOLOGIJA 2014, 28.-30.6.2014. OPATIJA

GUEST LECTURES IN INTERNATIONAL CONFERENCES

1. I. Žiljak Stanimirović, K. Pap, "INFRAREDESIGN SECURITY GRAPHICS ON DIFFERENT PRINTED MATERIALS, PAPER AND TEXTILE", PIRA Security Printing & Alt. Solutions in Central & Eastern Europe and Russia, 26-27 Jan. 2011, Zagreb

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Research project manager: UNAPREĐIVANJE RADNIH TOKOVA U PROCESIMA GRAFIČKE REPRODUKCIJE, 128-1281957-1956, Key researcher: Klaudio Pap, Project duration: 3 years, 2007-2013
2. Researcher on a scientific research project HRVATSKA RJEČNIČKA BAŠTINA I HRVATSKI EUROPSKI IDENTITET, Code: 130-1301679-1380, Key researcher: Damir Boras, Faculty of Humanities and Social Sciences, Zagreb, Project duration: 3 years, 2007-
3. Research project manager: Sigurnosna zaštitna grafika s Postscript i rasterskim upravljanjem, project manager Klaudio Pap, Project duration: 2014

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 4

Course

Name of Course: **PHYSICAL AND CHEMICAL PROPERTIES OF PRINTING INKS**

Code: **PDS 213**

Semester: II. Semester-Graphic engineering

Teacher: Đurđica Osterman Parac, full professor

Course Summary

Physical properties of printing inks before and during printing; rheology and viscosity. Effect of colour additives to theological behaviour: viscosity curve features, shear force, fluidity, extensibility, glutinosity. Relation between capillary forces of substrates and physical-chemical features of printing inks. Calculation of capillary forces – Washburn and Dawdson mathematical expression. Choice and physical-chemical features of additives based on rheological behaviour and adhesive and cohesive forces features on printing substrate. Environmental parameters in choice of printing inks; toxicity and biodegradability of coloured components.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

Social and ethical responsibility for scientific research

Description of teaching methods:

Lectures. Laboratory exercises

Compulsory literature:

1. J.Storey; Textile Printing, Thames and Hudson, London 1992
2. J.Bieleman; Additives for Coatings. Wiley-VCH, New York 2001
3. P. W. Atkins, Atkins' Physical chemistry, 8. izd., Oxford University Press, Oxford, 2006.

Additional literature:

1. Đ. Parac-Osterman: Interni materijali sa slajdovima za predavanja
2. Respective scientific journals

Number of lectures: 30

ECTS: 7

Teaching quality control:

Active participation in classes. Project assignment

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Đurđica Osterman Parac, full professor

E-mail: djparac@ttf.hr

Work institution: Faculty of Textile Technology, University of Zagreb

Short CV:

2005 full professor with tenure at the Faculty of Textile Technology;
2000-2005 full professor at the Faculty of Textile Technology
1993-2000 associate professor at the Faculty of Textile Technology
1987-1993 assistant professor at the Faculty of Textile Technology
1972 assistant at the Faculty of Textile Technology
1988-1991 visiting professor at the Faculty of Technology in Banja Luka
1998-2004 adjunct professor in the doctoral program at the University of Maribor
2000 – to date, adjunct professor in the doctoral program at the Faculty of Graphic Arts in Zagreb and University of Dubrovnik
Research project manager: national „Dyes and colours in the process of eco-friendly sustainable development"(1171419-1401) and „Logic phase application in the processes of colouring and colour measurement" (0117004); *bilateral Slovenia/Croatia: "Textile fibres as protection against ultraviolet radiation" and *EUREKA Project E!2983 TEXTILWET "
Areas of scientific work; Chemistry of dyes, physical, chemical and dyeing properties of natural and chemical fibres, rheological properties in the thickener/printing paste system, waste water, the phenomenon of colour in application and multimedia, the science of colour, colorimetry, spectrophotometry, theory of colour, colour and marketing. Exploring the binding of multifunctional dyes on textile material and characterization of properties from the aspect of multiple application (UV protection, passive sensors, military clothes, microbiological and other properties). Natural dyes, preservation and analysis of historical textile, positive effect on health, creativity, fashion and tourism. The significance of color in management and promotional presentations.

Date of last academic appointment to the teaching and research position: 2005

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Glogar, M. I.; Parac – Osterman, Đ.; Grundler, D.; Rolich, T.: Research of Influences of Surface Structure of Coloured Textiles: Applying Fuzzy Logic, Coloration Technology, 127 (2011) 6, 396 – 403
2. Parac – Osterman, Đ.; Hajsan Dolinar, V.; Glogar, M. I.: Clothing Colours and Behaviour of Pupils of Primary School Age, Tekstil 60 (2011)7, 295 – 306
3. Zjakić, Igor; Parac-Osterman, Djurdjica; Bates, Irena.; New approach to metamerism measurement on halftone color images. // Measurement. 44 (2011) , 8; 1441-1447
4. Parac-Osterman, Đurđica; Đurašević, V. Termokromna bojila - termo senzori, Blaž Baromić, 5. medunarodna konferencija tiskarstva, dizajna i grafičkih komunikacija, 2011. 544-552
5. Parac – Osterman, Đ.; Sutlović, A.; Đurašević, V.; Glogar, M. I.: Characteristics of Dyes in New Millennium, Proceedings of 4th International scientific – professional Symposium Textile Science and Economy, Croatia, (2011), 135 – 140
6. Parac-Osterman, Đ.; Sutlović, A.; Đurašević, V. Pročišćavanje otpadnih voda bojadisaone fizikalno - kemijskom metodom i biosorpcijom - mogućnost recikliranja vode, Tekstil, 59 (2011) , 7; 307-316

7. Glogar, M. I.; Parac – Osterman, Đ.; Laštro, A.: Application of Numerical Evaluation of Colour in Harmonious Relations Definition Among Colours in Textile Design, Tekstil 61(2012)1-6, 74 – 94
8. Hunjet, A. Parac-Osterman, Đ. Vučaj, E.: Statistic Analyses of the Color Experience According to the Age of the Observer (accepted for publication in: Coll.Antropol.Vol.37, Suppl 2 (2013).
9. Vedran Durasevic, Durdica Parac-Osterman; Fatigue Determination of Photochromic Dyes in Silica and Polyamide Matrices via Analysis of CIELAB Parameters// AATCC Journal, 2014., 22-36
   Knjiga
10. Parac-Osterman Đurđica, Karaman Boris:Osnove teorije bojenja tekstila; Sveučilišni udžbenik, Tekstilno-tehnološki fakultet, 2013. ISBN 978-953-7105-37-2
11. Parac-Osterman Đurđica: Osnove o boji i sustavi vrednovanja, Sveučilišni udžbenik, Tekstilno-tehnološki fakultet, 2013. ISBN:978-953-7105-11-2
    a. 1.2-Poglavlja u knjizi:
12. Parac – Osterman, Đ.; Glogar, M. I.; Rolich, T.: The Possibility of Applying Fuzzy Logic Outside the Range of E-Technologies, Fuzzy Logic: Applications, Systems and Technologies, Nova Science Publishers Inc, January 2013, ISBN: 978-1-62417-160-4, pp. 83 – 132
13. Đurašević, Vedran; Osterman-Parac, Đurđica; Sutlović, Ana.:From Murex Purpura to Sensory Photochromic Textiles // Textile Dyeing / Hauser, Peter(ur.).Rijeka: InTech, 2011. Str. 57-76.
14. Đurašević, Vedran; Parac-Osterman, Đurđica.; Analyses of Photochromic Potective Smart Textile // 150 Years of Research and Innovation in Textile Science / Adolphe, Dominique; Schacher, Laurence (ur.).Wittenheim, Francuska : Ecole nationale Superieure d'Ingenieurs Sud-Alsace, 2011. Str. 874-878.
    Scientific activity https://lib.irb.hr/web/hr/baze.../

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. "Boja i bojila u procesu ekološki prihvatljivog i održivog razvoja" (br. 117-1171419-1401), MZOŠ RH 2007-2011
2. „SMILES (Sustainable Measures for Industrial Laundry Expansion Strategies SMART LAUNDRY"- 2015), FP7 project New technologies for water and energy savings in EU industrial laundries, hrvatski , project manager: professor Tanja Pušić, 2009–2012

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 7

Course

Name of Course: **MULTIMEDIA NETWORK TECHNOLOGIES**

Code: **PDS 214**

Semester: II. Semester – Graphic engineering

Teacher: Karolj Skala, full professor

Course Summary

Network theory. Evolution and functionality of networks.
Network topology as a process. Network features.
Network protocols. Broadband network architecture.
Broadband media communication.
Network computing systems.
Distributed Computing Systems.
Distributed multimedia systems.
Broadband network communications in business and graphic technology.
Distributed networking (Grid, Cloud, Rain, Dew Computing)
New communication paradigms

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- insight into the theory and practice of multimedia communications
- skills in the use of modern tools and methods, integration of broadband multimedia systems and practical application in modern communications
- fundamental skills to design and develop solutions by means of modern computer and communication technologies
- knowledge of network communication techniques and technologies
- familiarization with tools and skills of application networking services
- ability to identify and solve problems of modern communication channels using multimedia technologies.
- skills to develop problem-solving skills using modern scientific multimedia broadband network communication skills
- encouragement to creativity, problem solving, cooperation, communication co-orientation
- competence to solve problems, expand communications capabilities
- skills in the new application of modern ICT technologies
- knowledge, methods, skills, techniques and tools used in business practice
- familiarization with distributed networking and broadband network services

Description of teaching methods:

Active participation of students. Oral presentation.

Teaching materials are accompanied by a PPT presentation. Illustrations by web content, animations and video demonstrations available. Discussion and analysis through tasks and questions. Presentation of seminar papers and discussion. Exercises with examples and practical work.

Compulsory literature:

1. Skala, K., 2003., Optoelektronički sustavi, Zagreb, 2003
2. Chang Wen Chen, Zhu Li, Shiguo Lian, Intelligent Multimedia Communication: Techniques and Applications, ISBN: 978-3-642-11685-8 (Print) 978-3-642-11686-5, 2010
3. Mario Marques da Silva, Multimedia Communications and Networking ISBN 9781439874844 - CAT# K13470, CRC Press 2012

Additional literature:

According to the particular interest of the candidate and the topic of his/her doctoral thesis.

Selected scientific papers

Number of lectures: 25

ECTS: 6

Teaching quality control:

Seminar paper, scientific paper i oral exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Karolj Skala, full professor

E-mail: skala@irb.hr

Work Institution: Ruđer Bošković Institute, Zagreb

Short CV:

Karolj Skala was born on 21 January in Subotica. He graduated in 1974 at the programme type Electrical engineering, and earned his Master's degree in 1979 under the topic of „Transfer of digital data by semiconductor laser". He defended his doctoral thesis „Analysis of reflection detectability in wide angle non-coherent optical illumination" at the Faculty of electrical engineering and computer science in 1983.

Professor Karolj Skala, PhD, tenured fellow (2005) at the Ruđer Bošković Institute in Zagreb, holds the position of Head of Centre for Informatics and Computer Science. At the University of Zagreb je is a full professor, tenured, and he teaches at the following courses: Optoelectronic systems, Digital multimedia and Multimedia communication, Programming logical systems. He is also research project manager of several national scientific and technological projects. He initiated the CRO GRID national programme which generated the CRO NGI. He has participated in the EU projects COST 254, COST 276 i COST IC 0805 from Croatia. He successfully completed five EU FP 6, and seven EU FP7 projects. He was research project manager of many development projects in the

area of purpose optoelectronic and laser devices. These projects resulted in production and income in the international market. He founded the eScience technology in Croatia and he has been working on eInfrastructural connection with European Research Area. He has started several eScience scientific services. He has initiated the development of scientific Cloud computing scientific infrastructures and has equipped a visualisation laboratory with EU funds.

So far, his scientific-research work includes: 72 research papers, 42 professional papers, one published book in co-authorship, three seminar textbooks, one university textbook and edition of 18 research papers proceedings, and he has also supervised 25 graduate papers. He has been a member of the Croatian Academy of Engineering and adjunct member of Hungarian Academy of Science.

Date of last academic appointment to the teaching and research position: 2014

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Davor Davidovic, Matjaz Depolli, Tomislav Lipic, Karolj Skala, Roman Trobec, Energy Efficiency of Parallel Multicore Programs, Scalable Computing: Practice and Experience , Vol 16 No4, 2015
2. Karolj Skala, at al, Scalable Distributed Computing Hierarchy: Cloud, Fog and Dew Computing, Open Journal of Cloud Computing, Vol 2, No 1, 2015.
3. Karolj Skala, Davor Davidović, Tomislav Lipić, Ivan Sović, G-Phenomena as a Base of Scalable Distributed Computing (G-Phenomena in Moore's Law), International Journal of Internet and Distributed Systems, V2, No1 PP. 1-4 DOI: 10.4236/ijids.
4. Skala, Tibor; Todorovac, Mirsad; Skala, Karolj, Distributed reliable rendering method for parametric modelling. Journal of, Circuits Systems and Computers 22 (2013) , 2; 1-19
5. Skala Karolj, Lipić, Tomislav; Sović, Ivan; Grubišić, Ivan; Grbeša, Igor, Toward 3D Thermal Models Standardisation for Human Body in Motion, Quantitative InfraRed Thermography Journal. Vol. 11, No 2, 2013
6. Skala, Tibor; Skala, Karolj, Afgan Enis Impact of 3D Graphic Structure Complexity to the Rendering Time, Journal of, Circuits Systems and Computers 22 (2013) , 8; 12-21
7. Lučić, Bono; Sović, Ivan; Batista, Jadranko; Skala, Karolj; Plavšić, Dejan; Vikić-Topić, Dražen; Bešlo, Drago; Nikolić, Sonja; Trinajstić, Nenad, The Sum-Connectivity Index - An Additive Variant of the Randić Connectivity Index. // Current computer-aided drug design. 9 (2013) ; 184-194
8. Afgan, Enis; Bangalore, P.; Skala, Karolj., Application Information Services for Distributed Computing Environments. Future generation computer systems. 27 (2010) , 2; 173-181
9. Skala, Karolj; Lipic, Tomislav; Sovic, Ivan; Gjenero, Luko; Grubisic, Ivan, 4D Thermal Imaging System for Medical Applications. Periodicum biologorum. 113 (2011) , 4; 407-416
10. Skala, Karolj; Lipić, Tomislav; Sović, Ivan; Gjenero, Luko; Grubišić, Ivan. 4D Thermal Imaging System for Medical Applications. // Periodicum biologorum. 113 (2011) , 4; 407-416
11. Sović, Ivan; Lipić, Tomislav; Gjenero, Luko; Ivan Grubišić; Skala, Karolj, Experimental verification of heat source parameter stimation from 3D thermograms. // Periodicum biologorum. 113 (2011) , 4; 417-423

12. Davidovic Davor; Skala, Karolj; Belusic, Danijel; Telisman-Prtenjak, Maja. Grid implementation of the Weather Research and Forecasting model. Earth Science Informatics. 3 (2010) , 4; 199-208
13. Medved Rogina, Branka; Skoda, Peter; Skala, Karolj; Michieli, Ivan. Metastability Testing at FPGA Circuit Design using Propagation Time Characterization. Radioelectronics & Informatics Journal. 51 (2010) ,4; 4-8

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. SEE GRID SCI - SEE-GRID eInfrastructure for regional eScience, EU FP7, 2008-2010
2. DARIAH - Digital Research Infrastructure for the Arts and Humanities, EU FP7, 2008-2010
3. EGEE-II - Enabling Grids for E-science-II, EU FP6, 2006-2008
4. EGEE-III - Enabling Grids for E-science-III, EU FP7, 2008-2010
5. COST # 0805, Open European Network for High Performance Computing on Complex Environments, 2010-2013
6. AIS DC Application Information Services for Distributed Computing Environments Acronym, EU FP7, 2011-2013
7. SCI BUS eScience infrastructure for storm and waterspout prediction in the Adriatic sea EU FP7 2012-2014
8. E2LP, Embedded Computer Engineering Learning Platform, EU FP7, 2012-2015
9. INDIGO DATA CLOUD Integrating Distributed data Infrastructures for Global Exploitation , Horizon 2020, 2015-2018,
10. EGI ENGANGE European Grid Initiative Vision of the Open Science Commons, Horizon 2020, 2015-2018,
11. SESAME NET Supercomputing Expertise for Small and Medium Enterprise Network, Horizon 2020, 2015-2018.

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 4

Course

Name of Course: **ELECTROCHEMICAL METHODS IN GRAPHIC TECHNOLOGY**

Code: **PDS 215**

Semester: II. Semester – Graphic engineering

Teacher: Sanja Mahović Poljaček, associate professor

Course Summary

The concepts of electrochemistry, electrochemical redox reactions and mechanisms of charge transfer. Electrodes and electrode potential, measurement of electrode potential. Galvanic cell.
Double layer, thermodynamics of electrified phase boundary. Electrochemical kinetics, Influence of electroactive particle transfer, current dependence on electrode potential. Electrolysis, discharge potential, Faraday's laws of electrolysis. Electrokinetic phenomena, zeta potential.
Corrosion and protection of materials. Electrochemical methods in graphic technology (electroplating, anodising, electrochemical impedance spectroscopy, cyclic voltammetry, electrochemical corrosion test methods, etc.).

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to create and evaluate new facts in the field of electrochemistry
- advanced, complex and topical knowledge and skills in the field of electrochemistry in graphic technology

Description of teaching methods:

Lectures

Compulsory literature:

1. Bockris, J.O'M., Reddy, A.K.N., Gamboa-Aldeco, M.E., (2000), Modern Electrochemistry - Fundamentals of Electrodics, US: Springer
2. Vayenas, C.G., Conway, B.C. , White, R.E., (2004), Modern Aspects of Electrochemistry, vol. 36, US: Springer
3. Piljac, I., (1995), Elektroanalitičke metode: teorijske osnove, mjerne naprave i primjena, Udžbenici Sveučilišta u Zagrebu, Zagreb: RMC
4. Radošević J., (2007), Elektrokemija, Skripta, Split: KTF
5. Lasia A., (1999), Electrochemical Impedance Spectroscopy and its Applications, Département de chimie, Université de Sherbrooke, Sherbrooke Québec
6. Stupnišek Lisac, E., (2007), Korozija i zaštita konstrukcijskih materijala, Zagreb: Fakultet kemijskog inženjerstva i tehnologije

Additional literature:

1. Mahović Poljaček, S.; Risović, D.; Cigula, T.; Gojo, M., (2012), Application of electrochemical impedance spectroscopy in characterization of structural changes of printing plates, Journal of solid state electrochemistry 16, 3; 1077-1089.
2. Risović, D., Mahović Poljaček, S., Gojo, M., (2009), On correlation between fractal dimension and profilometric parameters in characterization of surface topographies, Applied Surface Science 255, 7; 4283-4288.
3. Risović, D., Mahović Poljaček, S., Furić, K., Gojo, M., (2008), Inferring fractal dimension of rough/porous surfaces - a comparison of SEM image analysis and electrochemical impedance spectroscopy methods, Applied Surface Science 255, 5 Part 2; 3063-3070.

Number of lectures: 20

ECTS: 5

Teaching quality control:

Scientific paper dealing with a suggested topic, featuring an experimental part.

Application of electrochemical methods and other procedures related to the subject matter of the course

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Sanja Mahović Poljaček, associate professor

E-mail: smahovic@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Associate Professor Sanja Mahović Poljaček, MSc PhD was born on 15 December 1974 in Zagreb. She completed her elementary education in Samobor and graduated from the 5th Grammar high school in Zagreb. In 1993 she started her studies in Graphic arts at the University of Zagreb, programme type: graphic product design and graduated in 1998.

As a student she was awarded a scholarship by the Ministry of science and education based on her grade point average.

From 1996 to 2001 she worked as a graphic designer for the "Sant" company and in the visual communication studio Graffiti Design. In 2001, she was appointed junior assistant at the Faculty of graphic arts, University of Zagreb, first at the Department of Reproduction Photography, but later at the Department of Printing plates, where she is currently working. She started her postgraduate study in graphic technology at the Faculty of Graphic Arts and completed her Master's Degree, which was entitled ''Influence of different offset printing forms on graphic reproduction quality" on 13 February 2004. In 2006, she was awarded a scholarship by the Ministry of science, education and sports, which included student traveling arrangements and postgraduate training programme at Forga Institute in Munich. She completed her doctoral thesis, entitled "Surface

properties categorization of offset printing plates" on 25 May 2007 at the Faculty of Graphic Arts University of Zagreb. She has been a research associate on many science projects supported by MZOŠ (Ministry of science, education and sports), such as, project code: 128-1201785-2228 New Approach to the Printing Forms Microsurface Characterisation, project code: 128-1281957-1958 "Digitalization of museum art heritage" (since 2007) and a bilateral project with Slovenia 'Electrochemical testing and corrosion resistance of aluminium and its oxides and application in print form for planographic printing" since 2010. In 2010 she was awarded a scholarship, which was a part of EU Lifelong Learning Programme for university staff training, founded by the Faculty of chemistry and chemical engineering in Maribor, Slovenia. In 2013, she was awarded the same scholarship for professional training in Spain, Madrid, at the'' Facultad de Informática de la Universidad Complutense de Madrid". She was appointed to the research fellow position on 1 March 2011 and to associate professor position on 20 May 2013.

Date of last academic appointment to the teaching and research position: May 20th 2013

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Faculty books:

1. Gojo, M.; Mahović Poljaček, S., (2013), Osnove tiskovnih formi, Zagreb: University of Zagreb Faculty of Graphic Arts

Book chapters:

2. Urbas, R.; Stankovič Elesini, U.; Cigula, T.; Mahović Poljaček, S., (2016),
3. Printing on Polymers Fundamentals and Applications - Pad printing, Oxford: Elsevier

Papers in journals:

4. Tomašegović, T.; Mahović Poljaček, S.; Leskovac, M., (2016), UVA and UVC modification of photo polymeric surface and application for flexographic deposition of thin coatings, Journal of applied polymer science (prihvaćen za objavu)
5. Tomašegović, T.; Beynon, D.; Claypole, T.; Mahović Poljaček, S., (2016), Tailoring the properties of deposited thin coating and print features in flexography by application of UV-ozone treatment, Journal of coatings technology and research (prihvaćen za objavljivanje).
6. Hoffmann-Walbeck, T.; Riegel, S.; Tuchel, B.; Mahović Poljaček, S.; Cigula, T.; Tomašegović, T., (2015), Quality Assurance of Process Free Thermal Plates, Acta graphica. 26, 3; 31-37.
7. Mahović Poljaček, S.; Tomašegović, T.; Cigula, T.; Gojo, M.; Milčić, D. (2014), Formation of the Printing Elements in the Photopolymer Material Used in Flexography, Key Engineering Materials, 611-612, 883-891.
8. Poljak, J.; Botella, G.; García, C.; Mahović Poljaček, S.; Matías, Manuel P.; Tirado, F., (2013), Offset Printing Plate Quality Sensor on a Low-Cost Processor, Sensors. 13, 14277-14300.
9. Tomašegović, T.; Mahović Poljaček, S.; Cigula, T., (2013), Impact of Screen Ruling on the Formation of the Printing Elements on the Flexographic Printing Plate, Acta graphica, 24; 1-12.

10. Tomašegović, T.; Mahović Poljaček, S.; Cigula, T., (2013), Surface properties of flexographic printing plates related to UVC post-treatment, Journal of Print and Media Technology Research, 2, 4; 227-233.
11. Mahović Poljaček, S.; Risović, D.; Cigula, T.; Gojo, M., (2012), Application of electrochemical impedance spectroscopy in characterization of structural changes of printing plates, Journal of solid state electrochemistry. 16, 3; 1077-1089.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Research project manager:

1. Bilateral German-Croatian scientific project "Quality insurance of processless printing plates", Project duration: 1. January 2014 -31. December 2015
2. Research support program of the University of Zagreb TP082 (2015)
3. Research support program of the University of Zagreb,TP1.73 (2014)

Project assistant:

4. Razvoj metoda mjerenja površina tiskovnih formi, br. 128-1201785-2228, Ministry of Science, Education and Sports, (2007-2014)
5. Digitalizacija muzejske slikarske baštine, br. 128-1281957-1958, Ministry of Science, Education and Sports, (2007-2014)
6. Elektrokemijska ispitivanja i korozijska otpornost aluminija i njegovih oksida i primjena na tiskovnoj formi za plošni tisak, Ministry of Science, Education and Sports, bilateral Slovenian-Croatian project (2010-2011)
7. Razvoj sustava ekološki prihvatljivijih modela pakiranja, University of Zagreb, research support program 1, br. 5.9.1.2. (2014)

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 1

Course

Name of Course: **ADVANCED PRINTING SYSTEMS**

Code: **PDS 216**

Semester: II. Semester - Graphic engineering

Teacher 1: Igor Zjakić, associate professor

Teacher 2: Irena Bates, assistant professor

Course Summary

The course is concerned with observing issues that occur in modern graphic production in advanced printing systems that are operated by different computer programmes and simulations of production. The issues of the course are related to the current state of technology in the market but the principles that allow easier assumption of future technological trends and expectations regarding these trends are also taught.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

➢ insight into advanced printing methods and systems to ensure the quality of graphic reproduction and its application

➢ familiarization with the production process and the impact on different methods of printing. ➢ ability to analyze the results of production and calculate the possibility of cost saving according to various technological and economic parameters

➢ competence to work with modern printing systems

Description of teaching methods:

With a sufficient number of students, teaching is provided through lectures and individual approach to solving certain issues by means of modern scientific methods. When there is a smaller number of students, the teaching is provided through tutorials where students research the issues related to the subject – presented in the bibliography in either Croatian or English – by applying scientific methods.

Compulsory literature:

1. Zjakić, I. (2007) Upravljanje kvalitetom ofsetnog tiska, Hrvatska Sveučilišna naklada

Additional literature:

1. Berns R., S., Principles of Color Technology, John Wiley&Sons, USA, 2000. Frank J. R. (Ed); GATF Encyclopedia of Graphic Communications, Pitsbourgh, GATFPress.
2. Kipphan, H., (2001) Handbook of print media, Berlin, Springer

Number of lectures: 20

ECTS: 5

Teaching quality control:

Taking exams follows after completion of scientific researches based on a specific issue and a conversation with the professor who will determine whether all the researches have been done according to the rules of the

profession and by applying the scientific research methods. In addition to the researches performed, the student must be able to explain the issues of the course content.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher 1

Name and Surname Igor Zjakić, associate professor

E-mail: izjakic@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Igor Zjakić graduated at the Faculty of Graphic Arts after completion of the Vocation school of graphic arts, programme type Printing. In 2000, he enrolled to postgraduate study at the Faculty of Graphic arts and in 2002 he became the first Master degree holder in Graphic technology in Croatia. In January 2005, he earned his doctoral degree at the Department of Printing at the Faculty of Graphic Arts, with a thesis entitled "Optimisation of grating system reproduction in print". Since 1993, he has been working at "Graf" as CEO, then in "AKD" as head of facilities and supervisor of technological processes as well as the CEO. He participated in the project for design of new Croatian passport and other protected documents. Until today, he has published more than 50 scientific and professional papers in Graphic technology, and has participated in many international and domestic professional conferences. He has authored several chapters published in international scientific books as well as several research papers in international journals with international review. In his 10-year experience in economy, he completed several courses related to graphic technology and management in Zurich, London and Budapest. For the last several years, he has been collaborating in the work of a scientific-professional conference "Blaž Baromić" as member of Program and Organisation Committee. He has also been a member of Program Committee of international conference DAAM headquartered in Wien, where he heads the part of "Graphic technology". At German organization IFRA, he is advisor for matters of quality in paper print. He wrote the following textbooks in the area of graphic technology and design: "Offset print quality management", "Colorimetry in multimedia systems" and "Psychology of colours".

Date of last academic appointment to the teaching and research position: July 13th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Skenderović-Božićević, M., Gajović, A, Zjakić, I., 2012, Identifying a Common Origin of Toner Printed Counterfeit Banknotes by micro-Raman Spectroscopy, Forensic Science International, Science Direct, 223, 314-320.
2. Dobrić, E., Bates I., Zjakić, I., 2013, The Influence of Impurities in Printing Substrate on the Deformation of Screen Element and Dot Gain in Coldset Print, Technical Gazette 20,(5), 817-822.
3. Valdec D., Zjakić I., Milković, M, 2013, The influence of variable parameters of flexographic printing on dot geometry of pre-printed printing substrate, Technical Gazette, 20(4), 659-667.

4. Bates I., Zjakić I., Budimir I., (in press), Assessment of the print quality parameters' impact on the high-quality flexographic print visual experience, Imaging Science Journal
5. Zjakić, Igor; Parac-Osterman, Đurđica; Irena; 2011, New approach to metamerism measurement on halftone color images, Measurement 44, p.p. 1441-1447.
6. Zjakić, Igor; Parac-Osterman, Đurđica, Bates, Glogar Martinia Ira; 2011, Influence of a textile structure on raster value increase in screen printing, Tekstil 60 (1), p.p. 1-8
7. Bates, Irena; Zjakić, Igor; Milković, Marin; 2011, Lightfastness and weatherfastness of overprint pattern obtained on polymer substrates, Tehnički vjesnik, 18, 3; 349-356.,
8. Milković, Marin; Mrvac, Nikola; Zjakić, Igor; 2012, Comparative Analysis of the Intensity and Assimilation Effects of the Eqivalent Geometric Structures of Graphic Reproduction, TTEM, Vol. 7. No. 2., 5/6; 905-912.
9. Zjakić, Igor; Bates, Irena; Milković, Marin. 2011, A Study of Dot Gain and Gamut for Prints Made With Highly Pigmented Inks, Technical Gazette 18, 2,
10. 1Galić, Eduard; Ljevak, Ivana; Zjakić, Igor: 2014, The Effect of Thermal Lamination Processes on Colorimetric Change in Spot Colours, Acta graphica. 25 (2015), 3-4; 83-90
11. Bates, Irena; Petric Maretić, Katja; Zjakić, Igor: 2014, Determining the Quality of a Reproduction Obtained with Digital Thermal Printing Plates, Acta graphica. 25, 3-4; 63-72

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. 2007- 2013"Studij tehnoloških čimbenika grafičkog dizajna za sustavno unapređenje kvalitete" Code: 128-1281955-1962, Ministry of Science, Education and Sports
2. Research support program of the Ministry of Science, Education and Sports, "Evaluacija grafičkih parametara u multimedijskom okruženju, Research project manager associate professor Igor Zjakić, University of Zagreb Faculty of Graphic Arts (2014-2015.)

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 4

Teacher 2

Name and Surname Irena Bates, assistant professor

E-mail: irena.bates@grf.hr

Work Institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Assistant professor Irena Bates was born on the 8th December 1978 in Zagreb. After graduating from a Natural Science and Mathematics High School in Zagreb in 1997, she continued her education at the Faculty of Graphic Arts in Zagreb, majoring in technical processes and technology.

She graduated from the Faculty of Graphic Arts in 2003 with the thesis entitled "Screen Printing Inks", under the mentorship of Professor Vesna Kropar Vančina.

She was first employed in the "Sun Chemical" company, a worldwide producer of printing inks and pigments. In 2004 she enrolled into the postgraduate study course at the Faculty of Graphic Arts in Zagreb and in November 2006 she was appointed assistant lecturer at the Department of Printing.

She participated in research training at several foreign faculties: Faculty of Natural Sciences and Engineering of the University of Ljubljana in Slovenia, the Faculty of Chemical and Food Technology, the Slovak University of Technology and at the Technological Educational Institution (TEI) of Athens.

She earned her PhD title in 2013 having defended the thesis "The study of flexographic print reproduction specific parameters" under the supervision of Assoc. Prof. Igor Zjakić.

In May 2015 she was appointed assistant professor at the Department of Printing at the Faculty of Graphic Arts in Zagreb.

She is associate on the project "Study on Graphic Design Technology Factors used for Systematic Quality Improvement" of the Ministry of Science, Education and Sports, managed by Assoc. Prof. Igor Zjakić. She has participated in many international and national scientific and professional conferences. She is the author of several chapters published in international scientific books and six research papers published in international peer-reviewed scientific journals (CC and SCI category).

Date of last academic appointment to the teaching and research position: 18. July 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. I. Zjakić, Đ. Parac-Osterman, I. Bates, „New approach to metamerism measurementon halftone colour images“, Measurement 44 (2011), p.p. 1441-1447. (CC, SCI) IF=0,853, cit: Scopus 2, WoS 1
2. I. Zjakić, I. Bates, M. Milković, "A Study of Dot Gain and Gamut for Prints Made With Highly Pigmented Inks", Technical Gazette 18, 2(2011), p.p. 227-235. (SCI – Expanded) IF=0,083
3. I. Bates, I. Zjakić, M. Milković, "Lightfastness and weather fastness of overprint pattern obtained on polymer substrates", Technical Gazette 18, 3(2011), p.p. 349-356. (SCI – Expanded) IF=0,083, cit: Scopus 1, WoS 1
4. E. Dobrić, I. Bates, I. Zjakić, "The influence of impurities in printing substrate on the
5. Deformation of screen element and dot gain in coldset print", Technical Gazette 20, 5 (2013), p.p. 817-822. (SCI – Expanded) IF= 0.601
6. I. Bates, I. Zjakić, I. Budimir, "Assessment of the print quality parameters' impact on the high-quality flexographic print visual experience", Imaging Science Journal 63 (2015) , 2; 103-110, (CC, SCI) IF=0.315
7. I. Bates, V. Džimbeg-Malčić, K. Itrić, "Optical deterioration of samples printed with basic Pantone inks", Acta graphica. 23 (2012) , 3-4; 79-90, (DOAJ, EBSCO, INSPEC, HRČAK)
8. I. Bates, K. Petric Maretić, I. Zjakić, „Determining the Quality of a Reproduction Obtained with Digital Thermal Printing Plates“, Acta graphica 25 (2014) , 3-4; 63-72
9. I.Bates, J. Mihić, V. Radić Seleš, A. Vuksanović, „Analysis of Samples Treated by Resistance Test Method Exposed to Accelerated Aging“,Acta graphica 26 (2015), 3, 23-30

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Research project associate in the following projects:

1. “Slama pšenoraži kao izvor vlakanaca u proizvodnji novinskog papira”, Research project manager: associate professor Željka Barbarić-Mikočević, 2013 – 2014
2. “Slama žitarica kao izvor primarnih vlakanaca u proizvodnji novinskog papira", Research project manager: associate professor Barbarić Mikočević Željka, 2014 – 2015
3. “Utjecaj ne-drvnih vlakanaca na kemijsku stabilnost grafičkog proizvoda”, Research project manager: associate professor Željka Barbarić-Mikočević, 2015 – 2016

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **PACKAGING: DUTIES AND REQUIREMENTS**

Code: **PDS 217**

Semester: II. Semester - Graphic engineering

Teacher 1: Branka Lajić, assistant professor

Teacher 2: Jesenka Pibernik, associate professor

Course Summary

Production flow, from raw input materials to end products.
Logistics, fleet, control of mechanical properties of input materials, material storage, semi-finished products, tracking technology, including economization of materials, material consumption, consumption of auxiliary materials, packing, stacking of end products on pallets.
Integrating knowledge about the production of paper, cardboard, corrugated cardboard, cardboard and laminate packaging with the knowledge about production control.
The course explores the interrelationships among design, materials, construction and environmental protection to develop new products in the field of packaging.
With respect to design the course focuses on creative problem solving in the field of materials and technical skills, as well as pragmatism and industry orientation.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- competence in the field of innovation, development of new projects and the process of preparing documentation in the field of packaging design
- ability to explore new models with the aim of increasing packaging quality of
- new insights in the field of packaging materials and dyes
- ability to apply new methods, instruments, tools and materials
- acquisition of competencies required of a production manager
- ethical and social responsibility for possible social consequences

Description of teaching methods:

Tutorials
Independent research or collaborative research with relevant companies

Compulsory literature:

2. Kirwan, M. J., (2005), Paper and Paperboard Packaging Technology, Blackwell Publishing, Oxford.
3. Markstrom, H., Testing Methods and Instruments for Corrugated Board, Lorenzten and Wettre.
4. Soroka, W., (1999) Fundamentals of packaging technology, The Institute of Packaging.

5. J.F. Handlon, J.R. Kesley, H.E.Forcinino, (1998) Handbook of Package engineering, third edition,CRCPress,Boca Raton,London,New York, Washinkton D.C.
6. A.L.Brody i K.S.Marsch, (1997)The Wilwy Enciklopedia of Packaging Technology,JohnWiley & Sons, Inc. New York, Chichester, Weinheim, Brisbane, Singapore, Toronto.
7. Klimchuk, A. R.; Krasovec, S. (2006):Packaging Design: Successful Product Branding from Concept to Shelf, John Wiley & Sons, Inc.

Additional literature:

8. Denison, E (2006) More Packaging Prototypes, Rotovision.
9. Ambrose, G., Harris P. (2011) Packaging the brand : the relationship between packaging design and brand identity, Lausanne : AVA Publishing.

Number of lectures: 20

ECTS: 5

Teaching quality control:

Seminar paper or a scientific paper for relevant journals. Exam.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher 1

Name and Surname Branka Lajić, assistant professor

E-mail: blajic@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Assistant professor Branka Lajić was born on 25.06.1952 in Maribor. After graduating from secondary school she studied at the Graphic Arts College in Zagreb, where she graduated in 1974. That same year she was employed in a packaging factory, where she had been working for 15 years and acquired valuable experience as technologist. In 1989 she was appointed research assistant at the Department for packaging, bookbinding and graphic design products, where she has been teaching ever since.

She defended her doctoral thesis entitled “Research on Dependence of a Corrugated Cardboard Box Strength on Material and Construction“ in 2006.

She focuses her scientific work on the production of corrugated cardboard packaging and the problems associated with this type of production.

Date of last academic appointment to the teaching and research position: 1. August 2013

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Pasanec, Preprotić, S., Budimir, I, Lajić, B, (2012), "The Bulky Paper Properties Influence on the Adhesive Bond Strength", MP Materials Testing, 54(4) 271-279.

2. Jamnicki, S.,Barušić, L., Lajić, B.,(2013) „Suitability evaluationof various recicled paper grades for the production of health safe food packaging", TTM – Technics Technologies Education Management, 8 (1) 70 -76.
3. Lajić, B., Majnarić, I. ,Bolanča, Mirković I.,(2013) „ Accelerated and natural ageing of offset prints covered with different varnishes", Nordic Pulp& Paper, 28 (1),101 – 110.
4. Budimir, I., Lajić, B., Pasanec, Preprotić S., (2012), "Evaluation of mechanical Strength of Five Layered Corrugated Cardbord Depending on the Type Waveforms", Acta Graphica. 23 (3-4), 111-120.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Teacher 2

Name and Surname Jesenka Pibernik, associate professor

E-mail: jpiberni@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Associate professor Jesenka Pibernik graduated at the Faculty of Architecture at the University of Zagreb in 1985. She earned her Master's degree in 1992 in USA, University of Texas at Austin (supervisor: Charles Moore, AIA). After graduation she stayed in USA and was a contracted worker on several architecture projects. Since 1995 she has lived in Zagreb.

Professor Pibernik was awarded several architectural awards and recognitions in architecture competitions and her work was displayed at several exhibitions, at Zagreb Salon, amongst other.

In 1998, after one-year part-time job, Jesenka Pibernik was employed at the Faculty of Graphic Arts at the University of Zagreb. She earned her PhD degree in 2003 at the Faculty of Architecture at the University of Zagreb. She co-authored the university course book „Digital space design", published by Croatian University Press. Jesenka Pibernik teaches at undergraduate, graduate and postgraduate levels at the Faculty of Graphic Arts at the University of Zagreb within the Department of Art History and Graphic Design and she also holds the position of Dean of Finance and General Affairs.

Professor Pibernik has participated actively in several research projects in Croatian, in an EU-funded project within the COST program, as well as in a project within the framework of Science and Innovation Investment Fund. Her professional interests include: graphic design, web design, mobile graphics, design of communication services for people with complex communicational needs, user experience.

Date of last academic appointment to the teaching and research position: March 14th 2010

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

6. Poljičak, A. Dolić, J.; Pibernik, J. (2016): An optimized Radial Basis Function model for color characterization of a mobile device display. Displays. 41 ; 61-68.

7. Dolić, J.; Pibernik, J.; Majnarić, I. (2014): Influence of UV Varnish Pattern Effect on Print Quality. Journal of Imaging Science and Technology. 58
8. Pibernik, J.; Dolić J., Kanižaj, B. (2013): „What is creativity in web portfolio design" Digital Creativity 25. 126-139.
9. Cvitić, F.; Pavčević, O. M.; Pibernik, J. (2015):Two Messages out of One 2D Matrix Bar Code. KSII Transactions on internet and information systems.
10. Dolić, J., Pibernik J., Car Ž. (2013): Design and Development of Symbol Based Services for Persons with Complex Communication Needs. Acta Graphica 24. 1-2.
11. Cvitić F., Pibernik J. (2014): Decoding Different Patterns in Various Grey Tones Incorporated in the QR Code. Acta graphica. 25 , 1-2; 11-22.
12. Pibernik J.; Dolić J.; Dilberović I. (2011): „Proces dizajna T-majica tehnikom digitalnog tiska na tekstilu". Tekstil, vol. 60 , 10; 504-511.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Scientific projects:

1. Project of the Ministry of Science, Education and Sports „Evaluacija kvantitavnih i kvalitativnih kriterija procesa grafičke reprodukcije", 128-1281955-1960, key researcher: full professor Nikola Mrvac
2. Project „ICT sustavi za osobe sa složenim komunikacijskim potrebama", financed by the Development Fund of the University of Zagreb
3. COST project Action IC1003: European Network on Quality of Experience in Multimedia Systems and Services (QUALINET), field: Information i communication technology
4. Project EuropeAid/131920/M/ACT/HR, Science and Innovation Investment Fund Grant Scheme, Title: „ICT Competence Network for Innovative Services for Persons with Complex Communication Needs"

Research support programs of the University of Zagreb

1. Metode evaluacije grafičkih korisničkih sučelja aplikacija namijenjenih korisnicima sa kompleksnim komunikacijskim potrebama. 2013
2. Visokotehnološka rješenja za razvoj jezičnih sposobnosti kod složenih komunikacijskih potreba. 2015

Art projects:

1. Creative Europe Project- Culture Sub-programme (2014-2020) – 'Support to European cooperation projects – Smaller scale cooperation projects projects' – Call for proposals EACEA 32/2014 – Budget 2015." In Public In Particular

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 3

Course

Name of Course: **HISTORY OF BOOKBINDING**

Code: **PDS 218**

Semester: II. Semester-Graphic engineering

Teacher: Suzana Pasanec Preprotić, assistant professor

Course Summary

Familiarization with contemporary methods of research, classification, selection, definition and management of activities involved in bookbinding production, regardless of types of publication: books, magazines, pads, calendars, albums or catalogues.

Systematic approach upon testing, methods of classification, control and saving the obtained results.

Use of existing commercial and specific, custom-made computer programs.

Application of computer programs for packaging from all aspects.

Familiarization with quality control, statistics, packaging production, packaging machinery, environment and economy.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- specific knowledge in the field of technological improvements of bookbinding products
- competence in the management of scientific research activities
- skills to rationalize total cost of printing production
- ability to use research methods in the evaluation process
- insight into types of bookbinding, constructive solutions for retail, processing and mass production of books, organization of operational production based on business excellence
- ability to critically assess proposed solutions (case study);
- ability to present and substantiate own solutions

Description of teaching methods:

Tutorials.

Independent research under teacher's supervision

Compulsory literature:

1. Bajpai, P., Rijk, R., Sixta, R., (2013), Handbook of Paper and Boards, 2nd Edition, Germany, Wiley-VCH.
2. Edward, M. P., (2009), Handbook of Adhesive and Sealants, Vol. 2, General Knowledge, Application of Adhesives, New Curing Techniques by Philippe Cognard.
3. Roberts, J.C, (1996), The chemistry of paper, UK, Royal Society of Chemistry.
4. Niskanen, K., (1998), Paper Physics - Book 16, Finland, TAPPI.
5. Packman, D. E., (2003), The mechanical theory of adhesion. In:
6. Pizzi, A. and Mittal, K. L. (Eds.). Handbook of Adhesive Technology, 2nd ed., New York, Marcel Dekker.
7. Miltal, K.L., (1977), The Role of Interface in Adhesion Phenomena, Polymer Engineering Science, Vol.17.

8. Southworth, M., Southworth, D., (1990), Quality and Productivity in the Graphic Arts, USA, Graphic Arts Publishing.
9. Tompson, B., (2004), A PIRA International printing guide-Printing Materials: Science and technology.
10. Leekley, R.M., Secher J.J., (2010), The relationship between paper properties and adhesive book binding behavior, TAGA Abstracts, Printing Industries of America.
11. Juri, B. (2001), Osnove planiranja i organizacije grafičke proizvodnje, Zagreb, Acta Graphica.
12. Mikac, T., Blažević, D., (2007), Planiranje i upravljanje proizvodnjom, Rijeka, Tehnički fakultet Sveučilišta u Rijeci.
13. Goleman, D., (1997), Emotional Intelligence, Zagreb, Mozaik knjiga.

Additional literature:

1. Library Binding ANSI/NISO/LBI Z39.78-2000, (1990), American National Standard Developed by the National Information Standards Organization and the Library Binding Institute.
2. Marra, A. A., (1980), Applications in wood bonding. In: Blomquist, R. F.; Christiansen, A. W.; Gillespie, R. H. and Myers, G. E. (Eds.). Adhesive Bonding of Wood and Other Structural Materials. Educational Modules for Materials Science and Engineering (EMMSE) Project, Pennsylvania State University, University Park, PA, chap. 9.
3. Packham, D.E., (2003), Surface energy, surface topography and adhesion, International Journal of Adhesion & Adhesives, No.23, pp.437-448.
4. Gardner, J. D., (2005), Chapter 19. Adhesion mechanisms of Durable Wood Adhesive Bonds.
5. Adhesive Techniques (2000), Developments in the printing and paper making industries and their effect on adhesive techniques in the bookbinding trade, Brussels, Sappi Fine Paper Europe.
6. Gačnik, V., Vodenik, F., (1990), Projektiranje tehnoloških procesa, Zagreb, Tehnička knjiga.
7. Curis, M.A., (1988), Proces planning, New York, John Wiley and Sons.
8. Jurković, M., Tufekčić, D. (2000),Tehnološki procesi, projektiranje i modeliranje, Tehnički fakultet Rijeka.
9. Feldman, J., Mulle, K., (2007), Put Emotional Intelligence to Work: EQuip Yourself for Success, Virginia, ASTD Press Editirial Staff.
10. Stipčević, A. (2006), Povijest knjige, 2. Prošireno i dopunjeno izdanje, Zagreb, Matica Hrvatska.

Number of lectures: 20

ECTS: 5

Teaching quality control:

2 collaborative papers, presentation at a conference, publication in a journal (tertiary or secondary source)

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Suzana Pasanec Preprotić, assistant professor
E-mail: spasanec@grf.hr
Work institution: University of Zagreb, Faculty of Graphic Arts
Short CV:

Assistant professor Suzana Pasanec Preprotić, teaches a number of graduate and postgraduate courses, such as Introduction into graphic technology, Bookbinding, History of bookbinding, at the Department of bookbinding and packaging. She has participated in 3 scientific research projects financed by the University of Zagreb. She is currently participating in a research entitled „ Organic recycling waste paper and packaging". Her scientific interest is focused on organic recycling and alternative methods of organic biodegradability, including paper and plastic materials. She is a member of the Croatian Standards Institute-Divison 130 - Graphic Technology. Apart from her scientific work, she is keenly interested in bookbinding techniques including materials (paper, adhesive). She has exhibited her works in craft bookbinding and craft packaging exhibitions on several occasions.

Date of last academic appointment to the teaching and research position: May 19th 2015
List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. S. Pasanec Preprotić, D. Babić, A. Tuzović, (2011), "The influence of Paper permanence on Adhesive Joint Strength", TTEM-Technics Technologies Education Management,6 (4), 1024-1031.
2. S. Pasanec Preprotić, B. Lajić, (2011), "The High Grades Papers Bindability Impact Factors", in " Proceedings of the COST Training School (COST ACTION FP 1003) New Technologies for treatments in the end-of-use packaging materials", (ed. B. Lozo), Zagreb, 183-195.
3. S. Pasanec Preprotić, D. Babić, A. Tuzović, (2011), "Bindability of High Grades Papers by Perfect Binding Technique", Acta Graph. 22(1-2), 21-32.
4. Pasanec Preprotić, D. Babić, A. Tuzović, (2012) "Research of Adhesive Joint Strength Dependency in Relation to Position of Loose Leaf in Text Block", Technical Gazette, 19 (2012), 43-49.
5. S. Pasanec Preprotić, I. Budimir, B. Lajić, (2012)"The Bulky Paper Properties Influence on the Adhesive Bond Strength", MP Materials Testing, 54 (4), 271-279.
6. S. Pasanec Preprotić, S. Jamnicki, M. Jakovljević, (2014),"Criteria for choosing between adhesive methods in craft bookbinding ", Proceedings, 7th Symposium of Information and Graphic Arts Technology, Univerza v Ljubljani, Naravoslovnotehniška fakulteta, Oddelek za tekstilstvo (ed. Raša Urbas), Ljubljana, 69-75.
7. S. Pasanec Preprotić, M. Jakovljević, (2013), "Influence of high grades paper properties on adhesive binding strength in a humid condition", 11th Symposium on Graphic Arts, Conference Proceedings University of Pardubice, (ed. Department of Graphic Arts and Photophysics), Pardubice, 144-150.

8. S. Pasanec Preprotić, I. Budimir, G. Tomić, (2015),"Evaluation of binding strength depending on the adhesive binding methods", Acta Graphica 26(1-2), 20-27.
9. E. Dasović, G. Petković, S. Pasanec Preprotić, (2015), "Oblikovanje i budućnost knjižnog uveza u svijetu e-knjige", Tehnički glasnik, 9(4), 440-445.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

International scientific projects:

1. COST Action FP 1003 “Impact of Renewable Materials in Packaging for Sustainability - Development of Renewable Fibre and Bio-Based Materials for New Packaging Applications”, Research project manager: Kennert Johansson; project member since 2014, working group 3 “End-of-Life” (WG3).

National scientific projects:

1. “Funkcionalne aplikacije termokromnim tiskarskim bojama”, Research support program, Research project manager: full professor Branka Lozo
2. “Termokromne boje, stabilnost na svjetlu (molekularne promjene) i zdravstvena ispravnost”, Research support program, Research project manager: full professor Mirela Rožić
3. “Organsko recikliranje otpadnog papira i ambalažnog otpada“, Research support program, Research project manager: full professor Mirela Rožić

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **SOCIETY, SCIENCE AND TECHNOLOGY**

Code: **PDS 223**

Semester: II. Semester-Graphic engineering

Teacher: Jana Žiljak Vujić, associate professor

Course Summary

Modern aspects of social relations, science and technology.
Economic, educational, interdisciplinary, information-, communication-, graphic- and innovation-related aspects of society, science and technology.
Global analysis of the impact of new graphic technologies on the development of science, society and technology.
Transformative graphic processes and new scientific and technological developments. Strategies of scientific, technological and social development.
Science, society, technology and innovative aspects of society.
Development of technology and technological devices and transmission of media information.
The newly created need for individuals with to specialized skills in digital visual communication.
Development of graphic technology.
Encouragement to interdisciplinary research in the field of graphics.
Culture of scientific-technological and social communication about the future of graphics and technology in the context of the innovative processes.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- advanced knowledge of society, science and technology
- specific competencies, specialized knowledge, skills and techniques for innovative approaches to problem solving
- advanced knowledge in the field of computer typography design
- skills to develop and implement the acquired knowledge in the framework of professional, scientific, research and innovation activities

Description of teaching methods:

Tutorials, seminar paper, presentation

Compulsory literature:

1. Juraj Božićević: «Inovacijska kultura i tehnologijski razvoj», Hrvatsko društvo za sustave, Zagreb, 2009.
2. Boris Golob:»Inovacija od ideje do tržišta», Školska knjiga d.d., Zagreb, 2011.
3. M. Castels: Moć ideniteta / The Power of Identify, Informacijsko doba, Ekonomija, društvo i kultura, Golden Marketing, Zagreb, 2002. 466 str.

4. J.Plenković: Društvo i tehnologija, (Udžbenici Sveučilišta). Rijeka: Sveučilište u Rijeci: Građevinski fakultet Sveučilišta u Rijeci, 1995. 110 str.
5. J.Plenković, M.Plenković: Društvo, znanost i tehnologija, (Udžbenici Sveučilišta u Rijeci, Manualia universitatis studiorum fluminensis). Rijeka: Sveučilište u Rijeci, Građevinski fakultet, 1998. 178 str.,
6. J.Plenković: Edited by): Društvo i tehnologija / Soociety and Technology (2005; 2006; 2007; 2008; 2009;), Informatologia, Separat Speciale, No. 9; 10; 11; 12; 13; Zagreb.
7. V.Rosić: Društvo i tehnologija, Society and technology : znanstveni doprinos petnaestogodišnjeg rada međunarodnog znanstvenog skupa prof. dr. sc. Jurja Plenkovića (1994. - 2008.). Zagreb: Liber, 2008. 87 str.,
8. N. Antonovič Siroštan, M.Plenkoivć, J.Plenković: Obšćestvo, nauka i tehnologija. Naučnoe izd. Harkov: HGEU, 1997. 103 str.

Additional literature:

1. V.Rosić: Društvo i tehnologija, Society and technology : znanstveni doprinos petnaestogodišnjeg rada međunarodnog znanstvenog skupa prof. dr. sc. Jurja Plenkovića (1994. - 2008.). Zagreb: Liber, 2008. 87 str.,
2. N. Antonovič Siroštan, M.Plenkoivć, J.Plenković: Obšćestvo, nauka i tehnologija. Naučnoe izd. Harkov: HGEU, 1997. 103 str.

Number of lectures: 20

ECTS: 5

Teaching quality control:

Seminar paper and presentation. Evaluation of the presentation and the competences acquired in the course of lectures.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Jana Žiljak Vujić, associate professor

E-mail: janazv@tvz.hr

Work institution: University of Applied Sciences in Zagreb

Short CV:

Date of last academic appointment to the teaching and research position: 29th March 2016

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Scientific papers and reviews in CC indexed journals

Žiljak, Vilko; Pap, Klaudio; Žiljak-Stanimirović, Ivana; Žiljak-Vujić, Jana. Managing dual color properties with the Z-parameter in the visual and NIR spectrum. // Infrared physics & technology. 55 (2012) , 4; 326-336

Scientific papers in other journals

1. Friščić, Martina; Žiljak Vujić, Jana; Žiljak, Vilko. CMYKIR Separations for Printing on Transparent Polymer Materials. // ACTA GRAPHICA journal is published quarterly by Faculty of Graphic Arts, University of Zagreb, Croatia.. Vol 26, No 3 (2015) | Table of Contents (2015.) ; 16-22
2. Žiljak Vujić, Jana; Nazor, Dijana. Rezultati istraživanja umjetničkih slika starih majstora, modernih i suvremenih umjetnika infracrvenim postupkom. // 7. susreti Sekcije restauratora i preparatora Hrvatskog muzejskog društva. 7. (2015) ; 55-60
3. Bernašek, Aleksandra; Žiljak Vujić, Jana; Uglješić Vesna. Vizualni i infracrveni spektar za bojila digitalnog tiska. // Polytechnic and design. 2 (2014) , 2; 163-168
4. Pap, Klaudio; Žiljak Vujić, Jana; Leiner Maksan, Ulla; Uglješić, Vesna. Metoda izrade dualnog portreta na osobnim dokumentima. // Polytechnic and Design. 1 (2013) ; 33-38
5. Žiljak Stanimirović, Ivana; Žiljak Vujic, Jana; Morić Kolarić, Branka; Rudolf, Maja. Security printing with colorant control in the UV, visual and INFRARED spectrum. // Technics Technologies Education Management-TTEM. 8 (2013) , 2; 480-485
6. Žiljak Stanimirović, Ivana; Žiljak Vujić, Jana; Stanić Loknar, Nikolina. Marking of the camouflage uniform for visual and near infrared spectrum. // Technics Technologies Education Management. 8 (2013), 3; 920-926
7. Žiljak Vujić, Jana; Agić, Ana; Stanić Loknar, Nikolina. Picture information in expanded color management from visual to near infrared spectral domain. // Technics Technologies Education Management. 8 (2013) , 3; 942-950
8. Žiljak-Vujić, Jana; Rudolf, Maja; Morić, Branka; Friščić, Martina. Postage Stamps with hidden information in security Z values. // Technics Technologies Education Management (TTEM). 8 (2013) , 4; 1466-1473
9. Žiljak Vujić, Jana; Žiljak Stanimirović, Ivana; Bjelovučić Kopilović, Sanja; Friščić, Martina. Zaštita prozirne, savitljive plastične ambalaže postupkom INFRAREDESIGN®. // Polimeri : časopis za plastiku i gumu. 34 (2013) , 10; 42-46
10. Barišić, Mario; Žiljak-Vujić, Jana; Lajkovič, Josipa. CLOSE LOOP DENSITY CONTROL AS AN IMPROVEMENT REGARDING PAPER WASTE IN HEATSET PRINTING TECHNOLOGY. // Tehnički Vjesnik-Technical Gazette. 19 (2012) , 4; 1-8
11. Morić Kolarić, Branka; Budimir, Ivan; Žiljak Vujić, Jana. EFFICIENCY OF PRINTING TECHNOLOGIES OF GRAPHICALLY PROTECTED MATERIALS. // Acta Graphica znanstveni časopis za tiskarstvo i grafičke komunikacije. 23 (2012) , 1-2; 37-44

12. Morić-Kolarić, Branka; Budimir, Ivan; Žiljak-Vujić, Jana. Efficiency of Printing Technologies of Graphically Protected Materials. // Acta graphica. 23 (2012) , 1-2; 37-44
13. Rudolf, Maja; Koren, Tajana; Žiljak-Vujić, Jana. New postage stamp design with tone gradation in Infraredesign technology. // Acta graphica. 23 (2012) , 3-4; 57-64
14. Žiljak-Stanimirović, Ivana; Agić, Darko; Žiljak- Vujić, Jana. Hidden infrared image in a uniform CMYK separation hue. // Journal of graphic engineering and design. 3 (2012) , 2; 8-11
15. Žiljak, Vilko; Barišić, Mario; Žiljak-Vujić, Jana. Tipografija novčanica s posebnim osvrtom na Hrvatsku tijekom 20. stoljeća. // Libellarium. 4 (2012) , 2; 105-119
16. Žiljak-Vujić, Jana; Žiljak, Ivana; Međugorac, Olivera. Hidden information in visual and infrared spectrum. // Informatologia. 45 (2012) , 2; 96-102
17. Žiljak, Vilko; Akalović, Jadranka; Žiljak-Vujić, Jana. Upravljanje bojilima na koži u vizualnom i infracrvenom spektru. // Tekstil. 60 (2011) , 8; 355-363
18. Žiljak, Vilko; Barišić, Mario; Žiljak Vujić, Jana. Design and Typography of Croatian bank notes during 20th century. // Libellarium: journal for the history of writing, books and memory institutions. IV (2011) , 2; 105-125
19. Žiljak Vujić, Jana; Bernašek, Aleksandra; Koren, Tajana. Designing Raster Cells as the Basis for Developing Personal Graphic Language. // Journal of graphic Engineering and Design. 2 (2011) , 1; 31-37

Papers in other journals

1. Žiljak Vujić, Jana; Rajković, Ivan; Žiljak Stanimirović, Ivana. Simultano video snimanje u vizualnom i infracrvenom spektru proširene v/z stvarnosti. // POLYTECHNIC & DESIGN. 2 (2014), 1; 73-78

Peer-reviewed scientific papers in the proceedings of international conferences

1. Žiljak Vujić, Jana; Matas, Maja; Pogarčić, Matej; Žiljak Stanimirović, Ivana. Topographic Maps with Infrared Colours // Procedia Engineering, 25th DAAAM International Symposium on Intelligent Manufacturing and Automation, 2014 / Katalinic, Branko (ur.). Vienna : DAAAM International, 2015. 928-935
2. Žiljak Vujić, Jana; Nazor, Diana; Tepeš Golubić, Lidija. EXPANDED COMMUNICATION OF PAINTINGS CONSIDERATION AND CONCEPTUALIZATION OF THE WORKS OF ART IN THE INFRA-RED AREA, OF MODERN AND CONTEMPORARY ARTISTS - RESEARCH RESULTS OF THE ART-WORK OF OLD MASTERS, MODERN AND CONTEMPORARY ARTISTS, ARE BEING ANALYZED THROUGH THE INFRA-RED PROCEDURE // SOCIETY & TECHNOLOGY / DRUŠTVO I TEHNOLOGIJA 2015
3. Juraj Plenković / Plenković, Mario ; Toplak, Ludvik ; Galičić, Vlado ; Mustić, Daria (editor). Opatija : Hrvatsko komunikološko društvo, Alma Mater Europaea – ECM, Međunarodna federacija komunikoloških društava, 2015. 212-218

4. Žiljak Vujić, Jana; Prislan-Fujs, Stela; Hoić, Ana. WIDENED COMMUNICATION ON POSTAGE STAMPS – THE 1000TH POSTAGE STAMP OF THE REPUBLIC OF CROATIA // SOCIETY & TECHNOLOGY / DRUŠTVO I TEHNOLOGIJA 2015 Dr. Juraj Plenković / Plenković, Mario ; Toplak, Ludvik ; Galičić, Vlado ; Mustić, Daria (editor). Opatija : Hrvatsko komunikološko društvo, Alma Mater Europaea – ECM, Međunarodna federacija komunikoloških društava, 2015. 219-224
5. Žiljak Stanimirović, Ivana; Žiljak Vujić, Jana; Matas, Maja; Pogarčić, Matej. Spot colorant twins for infrared security print of topographic maps // 46th Annual International Conference on Graphic Arts and Media Technology, Management and Education / dr.Chrysoula Gatsou (editor). Atena : Hellenic Union of Graphic Arts and Media Technology Engineers, 2014. 18-18
6. Friščić, Martina; Žiljak-Vujić, Jana; Žiljak, Vilko; Pap, Klaudio. Nevidljiva grafika na transparentnim materijalima s flekso tiskom // International scientific conference on Printing & design 2013: proceedings: proceedings / Žiljak-Vujić, Jana (editor). Zagreb: Akademija tehničkih znanosti Hrvatske, Centar za graphic engineering, 2013. 156-161
7. Matas, Maja; Rajendrakumar, Anayath; Žiljak-Vujić, Jana; Hoić, Ana. The role and significance of a designer in postage stamp design with infrared graphics // International scientific conference on Printing & design 2013 / Žiljak-Vujić, Jana (editor). Zagreb : FotoSoft, 2013. 11-13
8. Politis, Anastasios-Manolis; Rudolf, Maja; Žiljak- Vujić, Jana. CMYKIR separation of two portraits for postage stamp design // TISKARSTVO & DIZAJN 2013 / Žiljak-Vujić, Jana (editor). Zagreb : FotoSoft, 2013. 7-10
9. Žiljak-Stanimirović, Ivana; Žiljak-Vujić, Jana; Matas, Maja. Infrared colorants as twins for security printing of documents and securities // International Circle of Educational Institutes for Graphic Arts: Technology and Management. 2013. 28-35
10. Branka Morić Kolarić, Ivan Budimir, Jana Žiljak Vujić. Understanding graphic protection methods in print production // Proceedings of the 39rd International Research Conference IARIGAI "Advances in Printing Science and Technology" / Lovreček, Mladen (ur.). 2012.
11. Friščić, Martina; Žiljak-Stanimirović, Ivana; Žiljak-Vujić, Jana. Infrared tehnologija u fleksotisku sa spot bojama // 16. međunarodna konferencija tiskarstva, dizajna i grafičkih komunikacija Blaž Baromić 2012 : Zbornik radova = 16th International Conference on Printing, Design and Graphic Communications, Blaž Baromić 2012 : Proceedings / Mikota, Miroslav (ur.). Zagreb : Hrvatsko društvo grafičara, 2012. 503-512

Other peer-reviewed papers published in proceedings

1. Žiljak Vujić, Jana; Friščić, Martina; Lajić, Branka. Prozirna, savitljiva ambalaža sa dvostrukim sakrivenim informacijama po infraredesign metodi // Fourth International Scientific Symposium of Graphic Technology and Design, Architecture, Civil Engineering, Security, Information and Textile Technology (GeTID&teh 2015) : proceedings / Babić, Darko (ur.). Travnik : Fakultet za tehničke studije Univerziteta u Travniku, 2015

Non peer-reviewed papers in the proceedings of international conferences

1. Čaljkušić, Igor; Hoić, Ana; Žiljak-Vujić, Jana. Reprodukcija likovnog djela s njegovim vizualnim i infracrvenim stanjem // TISKARSTVO & DIZAJN 2013 / Žiljak-Vujić, Jana (ur.). Zagreb : FotoSoft, 2013. 127-129 (predavanje,objavljeni rad,znanstveni). prilozen text radaURL link to work
2. Žiljak-Stanimirović, Ivana; Akalović, Jadranka; Žiljak-Vujić, Jana. Dizajn i tisak skrivenih podataka na koži sa spot bojilima koje imaju poznati Z faktor // Blaž Baromić 2012 proceedings / Mikota, Miroslav ; Pavlović, Ivana ; Ćutić, Darija ; Kajganović, Jelena (ur.). Zagreb : AKD, 2012. 479-490 (predavanje,objavljeni rad,znanstveni). prilozen text rada
3. Žiljak-Vujić, Jana. Projektiranje informacija za vizualni i infracrveni spektar // DRUŠTVO I TEHNOLOGIJA 2012. – DR.JURAJ PLENKOVIĆ / Plenković, Mario ; Mustić, Daria (ur.). 2012. 32-38 (predavanje,objavljeni rad,znanstveni).
4. Žiljak-Vujić, Jana; Koprivnjak, Sandra. Dizajn vojne uniforme s infrared zaštitom // Tiskarstvo 2012 & Design / Žiljak-Vujić, Jana (ur.). Zagreb : FotoSoft, 2012. 139-141 (predavanje,objavljeni rad). URL link to work
5. Žiljak-Vujić, Jana; Perčić, Dora. Infraredesign na ambalaži u farmaceutskoj industriji // Blaž Baromić 2012 proceedings / Mikota, Miroslav ; Pavlović, Ivana ; Ćutić, Darija ; Kajganović, Jelena (ur.). Zagreb : AKD, 2012. 38-46 (predavanje,objavljeni rad,znanstveni).

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Scientific and expert projects:

1. Digitalni sustavi u tiskarstvu, 2001. br. 0128003 i br. 0128009;
2. Unapređivanje radnih tokova u procesima grafičke reprodukcije, 128-1281957-1956, voditelj Klaudio Pap;
3. Hrvatska rječnička baština i hrvatski europski identitet, 130-1301679-1380, voditelj Damir Boras

Technological projects of the Ministry of Science, Education and Sports:

4. Softverski alati za izradu holografskih prototipova, TP-02/0128-09;
5. Metoda projektiranja hibridnih konfiguracija tiskarskih tehnologija, TP 02/0128-10, voditelj Darko Agić;
6. Unapređivanje radnih tokova u procesima grafičke reprodukcije, 128-1281957-1956, voditelj: Klaudio Pap.
7. Sudjelovanje u projektu „Politehnika 2025“, voditelj: Mladen

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **MULTIMEDIA COMMUNICATIONS**

Code: **PDS 224**

Semester: II. Semester-Graphic engineering

Teacher: Klaudio Pap, full professor

Course Summary

Development of multimedia communications.

Video signal, camera and CCD video sensors.

Transmitting and receiving signals. Types of television systems.

Digital processing of video and audio signals. Discrete cosine transform.

Standards for colour signal compression: JPEG, MPEG.

Types of media and applications: text, graphics, images, sound, animation.

Multimedia presentation and authorization.

Components of the multimedia system.

Learning, publishing, multimedia in medicine.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- familiarisation with web technologies
- skills to apply web technologies in web interfaces

Description of teaching methods:

Tutorial

Compulsory literature:

1. B. Fuhrt, Multimedia System and techniques, Kluwer Academic Publishers, 1996.
2. B. White, Multimedia Telecommunication, Chapman & Hall, 1997.
3. K.R. Rao and Z.S. Boljkovic, Multimedia Communication Systems, Prentice Hall PTR, 2002.

Additional literature:

Number of lectures: 30

ECTS: 7

Teaching quality control:

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Klaudio Pap, full professor

E-mail: kpap@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Full professor Klaudio Pap was born in 1963 in Zagreb. After graduating from a Natural Science and Mathematics High School he studied at the Faculty of Electrical Engineering and Computing in Zagreb and graduated from the Computing Techniques program in 1988. He earned his Master's degree in 1997 at Computing Sciences program at the same faculty, where he also received his doctoral degree in 2004. The same year he was appointed research associate at the University of Zagreb and assistant professor in the courses Computer Record and Computer Graphics. He has been an associate member of the Croatian Academy of Engineering since 2005, and became a senior research associate and associate professor at the University of Zagreb in 2010.

In his work he has been involved in research, development and application of computers in the area of computer graphics, image and text processing, computer models and simulations, web technology, digital printing and graphic programming languages.

He received the annual scientific award "Rikard Podhorsky" for 2010 from the Croatian Academy of Engineering and the National Award for Science for 2010, awarded by the Croatian Parliament. Together with his associates he received many gold medals for Infrared design innovation in Croatia and abroad.

He is the co-author of five (5) development products and six (6) software packages. He is the co-author of three (3) patents. He received the diamond award for digital printing in 1996 and more than fifty (50) international awards for the INFRAREDESIGN® innovation.

In his early work he set up new models of mathematical pixel transformation which served as a basis for new computer graphics. By using new computer models and the PostScript programming language new possibilities in computer graphics were created and applied in RIP printing systems.

He has participated in the development of many new procedures in printed matter protection. In the security field of graphic technology he processed and created new grating methods. Algorithms that enable the joining of a grating element to every image element individually were proposed. Deformations of grating elements from low to maximum opacity were developed. In this way, completely new functions of growth of grating elements were set up. New hybrid grating methods based on basic amplitudinally modulated method were created, with stochastic change of angle, lines and form of the grating element.

He is the initiator of the project and scientific research of standards and creating digital scales of norms and communication dictionaries in the processes of publishing, graphic preparation, printing processes and processes of graphic finishing, integration of knowledge about norms and standards in graphic industry from different sources into a unique way of description in the form of an XML-document. He is involved in the research of workflows in graphic production and the creation of digital workflow bases, as well as the processes of continuous automatic production, operation processing and operation monitoring, and the optimisation of the process of graphic reproduction using the digital workflow base.

His research includes setting up new methods in printing that use the infrared part of the electromagnetic spectrum with the possibility of creating a double image and double information. Such research was recognized internationally, patents were filed and gold medals won around the world for innovation with real application.

Date of last academic appointment to the teaching and research position: May 19th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Scientific papers published in tertiary sources

1. V. Žiljak, K. Pap, I. Žiljak Stanimirović, “DEVELOPMENT OF A PROTOTYPE FOR ZRGB INFRAREDESIGN DEVICE”, Technical Gazette. Vol.18 No.2 (2011); No.1802-11
2. V. Žiljak, K. Pap, I. Žiljak Stanimirović, J. Žiljak Vujić, “Managing dual color properties with the Z-parameter in the visual and NIR spectrum”, Infrared Physics and Technology Vol.55. No.4, ISSN 1350-4495, Elsevier B.V., p: 326-336, (2012)
3. S. Brekalo, K. Pap, N. Stanić Loknar, "OPTIMISATION OF AUTOMATIC VARIABLE GRAPHIC LAYOUT AND IMPOSITION", Technical Gazette: Vol. 23 (2016) , 1; 91-98

Scientific papers published in secondary sources

1. S. Pavazza, K. Pap, „ The Alternative Way of Creating Infographics Using SVG Technology “, Acta Graphica 23 (2012.) ISSN 0353-4707 pp: 45-56, Zagreb
2. K. Pap, Jana Žiljak Vujić, Ulla Leiner Maksan, Vesna Uglješić: "Metoda izrade dualnog portreta na osobnim dokumentima", Polytechnic & Design, ISSN 1849-1995, Vol. 1, No. 1, 2013
3. S. Brekalo, K. Pap: "DIGITAL PREPRESS OPTIMISATION FOR VARIABLE DIGITAL PRINTING OF BARCODES BY USING SCRIPTING TECHNOLOGIES", Polytechnic & Design, ISSN 1849-1995, Vol. 3, No. 2, 2015.

Peer-reviewed scientific papers in proceedings of international conferences

J. Ž. Vujić, K. Pap: SECURITY MARKING OF UNIFORMS AND DOCUMENTS IN VISUAL AND INFRARED SPECTRUM, INTERNATIONAL SCIENTIFIC AND PROFESSIONAL CONFERENCE “ NEW SECURITY THREATS AND CRITICAL NATIONAL INFRASTRUCTURE“ Zagreb, 12.–13. rujna 2013.

1. K.Pap, I. Ž. Stanimirović, M. Matas: „IRDMARK PROTECTION OF DOCUMENTS“, MEĐUNARODNA KONFERENCIJA PRINTING&DESIGN 2014, TERME TUHELJ
2. V. Žiljak, J. Ž. Vujić, D. Cafuta, K. Pap, I. Ž. Stanimirović, I. Dodig; MULTIMEDIA SYSTEM FOR VISUAL AND INFRARED SPECTRUM OF A NEW IDENTITY CARD, XXI. MEĐUNARODNI ZNANSTVENI SKUP, DRUŠTVO I TEHNOLOGIJA 2014, 28.-30.6.2014. OPATIJA

GUEST LECTURES HELD IN INTERNATIONAL CONFERENCES

I. Žiljak Stanimirović, K. Pap, "INFRAREDESIGN SECURITY GRAPHICS ON DIFFERENT PRINTED MATERIALS, PAPER AND TEXTILE", PIRA Security Printing & Alt. Solutions in Central & Eastern Europe and Russia, 26-27 Jan. 2011, Zagreb

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

3. Research research project manager, UNAPREĐIVANJE RADNIH TOKOVA U PROCESIMA GRAFIČKE REPRODUKCIJE, 128-1281957-1956, Glavni istraživač: Klaudio Pap, Trajanje projekta: 3g, 2007-2013,
4. Researcher on a scientific research project, HRVATSKA RJEČNIČKA BAŠTINA I HRVATSKI EUROPSKI IDENTITET, Code projekta: 130-1301679-1380, Glavni istraživač: Damir Boras, Filozofski fakultet, Zagreb Trajanje projekta: 3g, 2007-
5. Research research project manager: Sigurnosna zaštitna grafika s Postscript i rasterskim upravljanjem, , voditelj Klaudio Pap, Trajanje projekta: 2014

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 4

Course

Name of Course: **MULTIMEDIA BROADBAND NETWORKS**

Code: **PDS 225**

Semester: II. Semester-Graphic engineering

Teacher: Tibor Skala, assistant professor

Course Summary

Introduction into multimedia communications and standards.

Types of multimedia networks: ATM networks, IP networks, DSL networks, radio communication transfer, mobile and satellite networks, broadcasting networks.

Types of modulation of digital broadcast television transmitters.

Planning digital broadcasting networks.

Broadcasting network using a single frequency.

Impact of higher harmonics of digital broadcasting transmitters on the quality of media content.

Cable distribution of image, sound and data.

Architecture of multimedia broadband network.

Packet core network.

Technologies of physical layers. Technologies of data link layers.

Multiprotocol label switching. Network layers.

Mechanisms ensuring service quality in multimedia broadband networks.

Models of integrated and differentiated services.

Methods of traffic management in multimedia broadband networks.

Virtual private networks.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- specialist knowledge in the field of multimedia, broadband and computer systems
- profound understanding of computer science and software engineering
- competence in the field of design and maintenance of the system for processing and transmission of multimedia information, radio communication, cellular and satellite transmission

Description of teaching methods:

Tutorial, seminar paper, presentations

Compulsory literature:

1. D.H. Morais, Fixed Boradband Wireless Communications, Prentice Hall, 2004.
2. B. Furht, S.W. Smoliar and H. Zhang, Video and Image Processing in Multimedia, Cluver Academic Publisher, 1996.

3. R. Steinmentz and K. Nahrstedt, Media Coding and Content Processing, IMSC Press, Multimedia Series, 2002.
4. W. Zheng. Internet QoS. Morgan Kaufman, San Francisco, 2001.
5. M. Hassan, R. Jain. High Performance TCP/IP Networking. Pearson Prentice Hall, Upper-Saddle River, 2004
6. A. Stavdas. Core and Metro Networks. Wiley, 2010.

Additional literature:

1. A. Kumar, D. Manjunath, J. Kuri. Communication Networking – An Analytical Approach. Morgan Kaufmann, 2004.
2. P. Golden, H. Dedieu, K.S. Jacobsen. Fundamentals of DSL Technology, Auerbach Publications, Boca Raton, 2006.
3. L.G. Kazovsky et. al. Broadband Optical Access Networks, Wiley, Hoboken, NJ, 2011
4. XiPeng Xiao. Technical, Commercial and Regulatora Challenges of QoS. Morgan Kaufmann, Burlington, MA, 2008.

Number of lectures: 30

ECTS: 7

Teaching quality control:

Seminar paper, presentation.

Evaluation of the presentation and the competences acquired in the course of lectures.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Tibor Skala, assistant professor

E-mail: tibor.skala@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Assistant professor Tibor Skala graduated from the Faculty of Electrical Engineering and Computing in 2001. He was engaged as research assistant at the Department of Multimedia and Information Systems at the Faculty of Graphic Arts from 2004 to 2010. In 2010 he defended his thesis entitled “The efficiency of the process of generating graphical content on distributed systems" under the mentorship of full professor Nikola Mrvac (Faculty of Graphic Arts) and Professor Saša Divjak (Faculty of Computer and Information Science in Ljubljana) at the Faculty of Graphic Arts in Zagreb. Upon having earned his PhD title he was appointed senior research assistant and in 2015 assistant professor.

Tibor Skala is the author of thirty scientific and professional papers published in international and national journals and conference papers at national and international conferences. He is a member of the IEEE Computer Society and a member of the Executive Committee of the Association for the Promotion of Multimedia teaching (UMNA).

He actively participated in the realisation of numerous professional projects such as the establishment of the Reference centre for the development and adaptation of multimedia tools for e-learning at the Faculty of Graphic Arts and virtual transmission of image and sound by means of WLAN technology, Project Development Portal Graphic technology.

In 2013 Tibor Skala was appointed the scientific title of Research associate in the area of technical sciences, in the field of graphic technology and shortly afterwards in the field of computing.

He spent three months conducting research in the field of 3D multimedia communications under the mentorship of Professor Miklos Kozlovszky at the John von Neumann Faculty of Informatics of the Obuda University in Budapest, where in 2014 he was awarded by the Hungarian Academy of Sciences for postdoctoral studies.

In 2015 he was appointed assistant professor at the Department of Computer Graphics and Multimedia Systems, where he teaches a course within the Multimedia module.

Date of last academic appointment to the teaching and research position: May 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Skala, T.; Skala, K.; Afgan, E., Impact of 3D graphic structure complexity to the rendering time, Journal of Circuits, Systems, and Computers, Vol 22, No 07, 2013., pp. 10-16, (CC, SCI, SCI-Expanded)
2. Pavković N., Skala T., Vidić V, Automatic Enlarge and Deployment of Computer Cluster Using Dual-Boot Approach, Automatika – Journal for Control, Measurement, Electronics, Computing and Communications, Vol 54, No 02, 2013. Pp. 242-251, ISSN: 1848-3380, (SCI)
3. Skala T., Todorovac M., Skala K., Distributed reliable rendering method for parametric modeling, Journal of Circuits, Systems and Computer, Vol. 22 No.2,pp.1-19,(2013), DOI:10.1142/S0218126612500909, ISSN:0218-1266, (CC, SCI, SCI-Expanded)
4. Afgan E, Bangalore P., Skala T., Scheduling and planning job execution of loosely coupled applications, The Journal of Supercomputing, Vol. 59, No 3, pp. 1431-1454, (2012), DOI:10.1007/s11227-011-0555-y, ISSN: 0920-8542, (CC, SCI, SCI-Expanded)
5. Grubišić I., Gjenero L., Lipić T., Sović I., Skala T., Medical 3D thermography system, Periodicum Biologorum, Vol. 113, No 4, pp. 401-406, (2011), UDC 57:61, ISSN: 0031-5362, (SCI, SCI-Expanded)
6. Skala T., Kolarić D., Dujmović A., Extremities Perfusion Stimulation and Dynamic Evaluation by Thermography Analyses, Periodicum Biologorum, Vol. 112, No 4, pp. 475-478, (2010), UDC 57:61, ISSN: 0031-5362, (SCI, SCI-Expanded)

7. Skala T, Tomašić I., Mrvac N., Statistical Simulation of particle flow across Polymer fiber structure, Tekstil, Vol. 59, No 6, pp. 221-227, (2010), UDK: 677.017.622/63:677.076.4, ISSN: 0492-5882, (SCI, SCI-Expanded, SCOPUS

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

National scientific and research project of the Ministry of Science, Education and Sports

Researcher:

1. 2007. – 2013. „Evaluacija kvantitativnih i kvalitativnih kriterija procesa grafičke reprodukcije", Code: 128-1281955-1960

International scientific and research program

Researcher:

1. 2008 - 2010., SEE e-infrastructure for regional eScience – SEE GRID SCI EU FP7 project Cont. No. EC 211 338., EU FP7
2. 2006 - 2008. South-Eastern European Grid-enabled elnfrastructure Development- SEE GRID 2 EU FP 6 project Cont. No. EC 031775, EU FP 6
3. 2002 – 2003., Inteligent agents in educational programs, Pedagoški fakultet u Mariboru

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

INFORMATION PACKAGE

II. SEMESTER – GRAPHIC DESIGN

Course

Name of Course: **VISUALISATION IN GRAPHIC PRODUCT DESIGN**

Code: **PDS 301**

Semester: II. Semester - Graphic Design

Teacher: Dubravko Banić, associate professor

Course Summary

The aim of the course is to point to the importance of draft geometry application in graphic product modelling, as people can rarely manipulate virtual 3D objects with no aids and only in imagination. When solving geometrical problems, draft geometry is aided by space object images layout and by model development, either virtual on computer or real. This is the way to develop capacity of space layout as a factor of human intelligence, and a visualisation indispensable for designing a 3D graphic product. The course also includes which possibilities in 3D graphic product design are offered by knowledge interaction from draft geometry applied in computer programs. By using modern system in 3D graphic product design, the time for idea materialisation is reduced, it goes through the most favourable modelling for product, it draws attention and it offers a sense of satisfaction to the buyer.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to develop evaluation criteria in the application of descriptive geometry in graphic products design

Description of teaching methods:

Classes are in the form of oral presentation and conversation methods. Topic-specific oral presentation is introduction to coursework analysis which stimulates students during the conversation for independent conclusions.

Compulsory literature:

1. V. Szirovicza (2007) Descriptive geometry, Zagreb
2. C. Fishel, (2007) The little book of big packaging ideas, Rockport Publishers,
3. J. M. Garrofe, (2005) Structural Packaging, Index Book, Barcelona,
4. K. Horvatić-Baltasar, I. Babić, (1997) Nacrtna geometrija, SAND, Zagreb
5. G.R. Bertoline, E.W. Wiebe, (1995) Engineering Graphics Communication.R. D. Irwin Inc., Chicago
6. V. Niče, (1992) Deskriptivna geometrija, Školska knjiga, Zagreb,
7. D. Collins, (2003) Intelligent packaging, Pira International,

Additional literature:

1. E. Denison, (2008) Print and production finishes for packaging, RotoVision,
2. H. Brown, (2002) The art of maya : an introduction to 3D computer graphics, Alias/Wavefront,

Number of lectures: 20

ECTS: 5

Teaching quality control:

Active class participation and project task design is compulsory. Overall grade is a sum of class activities (20% of the total) and performance of project task (80%).

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Dubravko Banić, associate professor

E-mail: dbanic@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Dubravko Banić graduated in 1993 from the engineering study program at the Faculty of Mechanical Engineering and Naval Architecture, University of Zagreb. The subject of his graduate thesis was: Analysis and construction of mixers, and it was supervised by Vladimir Koharić, PhD, full professor.

He defended his doctoral dissertation (topic: Exploring the situation while maintaining printing rotations; supervised by V. Salamon, PhD, full professor) at the Faculty of Graphic Arts in Zagreb in 2006, and earned a PhD degree in the area of engineering sciences, field graphic technology. Since 1994, he has worked at the Faculty of Graphic Arts, University of Zagreb, as an expert associate at the Department of Graphic Machines. He was appointed senior assistant in 2006, and assistant professor since 2009.

He was course director for six courses: Graphic machines 1, Graphic machines 2, Automatics and maintenance of graphic machines, Re-engineering in graphic production, Optimization of parameters in the construction of graphic machines and Visualization in modelling graphic products.

He participated in the following scientific project: "A study of features and formulations of digital printing paper", project manager Stanislav Bolanča, PhD.

Since 2007, he has participated in the following scientific project:" Standardization of ecologically acceptable processes of graphic communications ", project manager Diana Milčić, PhD.

Within the area of graphic technology, he is primarily involved in research regarding the determining of the situation and proposing models for improvement of maintenance in graphic facilities, mechanisms in graphic machine constructions and the analysis of machine parameters that affect the quality of the final graphic product.

He is the author of about 80 scientific and professional papers.

Date of last academic appointment to the teaching and research position: July13th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Šarčević Iva, Banić Dubravko, Milčić Diana, (2013), Colorimetric Differences on Wood Susbstrate due to Varnishing Influence, Acta technica corviniensis - Bulletin of Engineering. 1, 91-94

2. Donevski Davor, Milčić Diana, Banić Dubravko, Poljaček Mahović Sanja, Tomašegović Tamara, (2014), Approaches to linearization in ICC profiles, International Circle
3. Donevski Davor, Milčić Diana, Banić Dubravko, (2014), THE USE OF SHOCK RESPONSE SPECTRUM IN PROTECTIVE PACKAGING DESIGN, Novaković, D. (u, Novi Sad : Faculty of Technical Sciences, 2014. 171-174
4. Šarčević Iva, Banić Dubravko, Milčić Diana, (2012), Personalization of a Product from Mass Production, Mass Customization and Open Innovation in Central Europe / Anišić, Zoran ; Freund, Robert (ur.).Novi Sad : Faculty of Technical Sciences in Novi Sad, . 203-206
5. Donevski Davor, Milčić Diana, Banić Dubravko, (2011), Polynomial Color Reproduction Device Model Term Significance, Norrkoping,

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

“Development of systems of environmentally friendly packaging models”, research support program, 2013
“Impact of non-wood fibres on the chemical stability of the printed products”, research support program, 2015

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **VIRTUAL PEOPLE**

Code: **PDS 302**

Semester: II. Semester - Graphic Design

Teacher: Sanja Bjelovučić Kopilović, associate professor

Course Summary

Foundations of biomechanics. Basics of anatomy and physiology of a human being. Simulation of people on the computer. Graphical models: volumetric models, parametric surfaces, networks of polygons. Human face modelling. Body animation: direct and inverse kinematics and dynamics, simulating the mechanical system: passive and active simulations, control systems. Animation of deformable bodies (special cases: skin, face, clothing and hair). Behaviour. Standards for virtual humans. Practical application in Open Source software package for modelling and animation – Blender.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- fundamentals in the field of biomechanics, necessary to understand the parameters required for the creation of virtual people in one of the 3D modelling and animation programs (Blender / 3dsMax).

Description of teaching methods:

lectures, computer workshop

Compulsory literature:

1. Muftić, O.: Mehanika živih sustava, Tehnička enciklopedija, Školska knjiga, Zagreb, 1989.
2. Roberts, S.: Character Animation: 2D Skills for Better 3D, Elsevier Ltd., Oxford, 2007.
3. Webster, C: Animation - The Mechanics of Motion, Elsevier Ltd., Oxford, 2008.
4. I. S. Pandžić, Virtualna okruženja, Udžbenici Sveučilišta u Zagrebu, Element, Zagreb, 2011.

Additional literature:

1. J. Foley, A. van Dam, J.. Hughes, R. Phillips, Introduction to Computer Graphics, AddisonWesley, 1997.
2. A. Menache, Understanding Motion Capture for Computer Animation and Video Games, Academic Press, 1999.
3. Williamson, J.. Character Development in Blender 2.5, Course Technology, Boston, 2012.

Number of lectures: 20

ECTS: 5

Description of teaching methods:

lectures, computer workshop

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Sanja Bjelovučić Kopilović, associate professor
E-mail: sbjelovu@grf.hr
Work institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Sanja Bjelovučić Kopilović was born on 15 July 1962 in Zagreb. She graduated at the Faculty of Electrical Engineering University of Zagreb in 1985, programme type, Industrial electronics, with a topic: „Calculation and design of isochronic map of heart activities“, (supervisor Prof. S. Tonković, PhD) (discipline: engineering sciences, fields: electrical engineering; branch: electronics). She earned her Master's degree on 31 January 1990 at the Faculty of Mechanical Engineering and Naval Architecture at the University of Zagreb, with a topic: „Human movement modelling as basis for biomechanical movement regulation analysis“ (supervisor: full professor O. Muftić). She graduated in 1997 at the same Faculty, same supervisor, with a topic: „Contribution to determining dynamic features of vehicles and passengers.“ In the period from 1 October 1985 to 31 December 1992 she was employed at the „Software centre“ of the „Nikola Tesla“ factory as system analytic, in the Electrical Engineering institute „Rade Končar“, on complex activities of developmental testing, at the Computer centre of “Zagrebačka banka” as a programmer, at the Institute of Anthropology at the University of Zagreb, as researcher-programme – statistician. From the period 1987-1990 she worked additional, contracted, for company „Animar“, Zagreb, in 3D animations on Amiga computer. Since 1 October 1991, during her permanent employment at the Institute of Anthropology, she did the work o fan assistant in additional activity at the course Technical Mechanics at the Faculty of Graphic Arts University of Zagreb. On 1 January 1993, she began her permanent employment at the Faculty of Graphic Arts University of Zagreb, where she was elected to the position of research assistant at the Department of Mechanical Engineering. On 15 May 1998 she was elected assistant professor, and on 1 October 1999 she was elected Head of Department of Mechanical Engineering at the Faculty of Graphic Arts University of Zagreb. 1 January 2004 she was appointed associate professor. On 15 December 2012 she was re-elected to the same position. Her re-election was extended due to her parental leave. She now heads the Department of Engineering Graphics and Mechanics.

She is fluent in English, and uses Italian and German passively.

Date of last academic appointment to the teaching and research position: October 22th 2012

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. S. Bjelovučić Kopilović, Suvremena računalna grafika u 3D aplikacijama, Međunarodni znanstveni skup Tiskarstvo 2012 & Design, AKADEMIJA TEHNIČKIH ZNANOSTI HRVATSKE – Centar za graphic engineering, Donja Stubica, Hrvatska, 2012., str. 6.-11.
2. S. Bjelovučić Kopilović, B. Vuković, V. Kopilović, Kvaternioni u 3D grafičkim aplikacijama i robotici primijenljivoj u grafičkoj industriji, Blaž Baromič, 16th International Conference on Printing, Design and Graphic Communications, Senj, Hrvatska, 2012.

3. S. Bjelovučić Kopilović, I. Strelar, V. Kopilović, Novo doba internet grafičkih komunikacija - društvene mreže u traženju poslova, Blaž Baromič, 16th International Conference on Printing, Design and Graphic Communications, Senj, Hrvatska, 2012.
4. S. Bjelovučić Kopilović, I. Strelar, K. Štih, Postavljanje kinematičkih kontrola na 3D kostur humanoidnog lika u 3ds Max-u, Međunarodni znanstveni skup Tiskarstvo & Design 2013., Terme Tuhelj, Hrvatska, 2013.
5. S. Bjelovučić Kopilović, T. Bistrović, 3D Animators, Mechanics, and 2D Animations, Blaž Baromič, 17th International Conference on Printing, Design and Graphic Communications, Senj, Hrvatska, 2013.
6. S. Bjelovučić Kopilović, B. Barbir, K. Štih, Comparison of 3D Rendering Systems, , Međunarodni znanstveni skup Tiskarstvo & Design 2014., Terme Tuhelj, Hrvatska, 2014.
7. J. Žiljak Vujić, I. Žiljak Stanimirović, S. Bjelovučić Kopilović, M. Friščić, "Zaštita prozirne, savitljive plastične ambalaže postupkom INFRAREDESIGN®", Polimeri (2014) 5, p: 181-191
8. S. Bjelovučić Kopilović, M. Knežević, CREATING MECHANICAL SIMULATIONS IN BLENDER BY „FAKING“, Blaž Baromič, 18th International Conference on Printing, Design and Graphic Communications, Senj, Hrvatska, 2014.
9. S. Bjelovučić Kopilović, B. Grgošić, Computer 3D Simulations of Modelling Trees, Međunarodni znanstveni skup Tiskarstvo & Design 2015., Zagreb, Hrvatska, 2015.
10. S. Bjelovučić Kopilović, L. Kessler, A. M. Hackenberger Kutuzović, “Analiza krivulje privlačnosti u odnosu na realnost izgleda ispitanog subjekta”, International scientific conference “Printing & Design 2016”, Zagreb, Croatia, 2016

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Scientific research project: "Grafika dokumenata i vrijednosnica" (128- 1281957-1961), Ministry of Science, Education and Sports

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **METHODOLOGY OF GRAPHIC PRESENTATION**

Code: **PDS 303**

Semester: II. Semester - Graphic Design

Teacher: Maja Brozović, full professor

Course Summary

Systematic concept involves the stratification of possibilities in relation to the final visually presentable system in a multidisciplinary context. Visual message is assessed by means of analysis of graphic solutions based on certain technological processes, according to the criteria posed by the type and the character of the medium itself. In line with the diversity of different graphic media, the Course focuses on working out adequate presentation of visual messages with regard to technological capacities and processes used in practice. The methodological approach is based on the subjective and objective methods of research.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to create and evaluate new insights in the field of research
- ability to create, analyze and evaluate new methods, instruments, tools and materials
- competences to conduct socially accepted communication and cooperation with international groups
- development of professionalism and ethical authority
- commitment to conduct research and develop new ideas
- social responsibility in the implementation of research results

Description of teaching methods:

Defining the object and purpose of the research, research plan (methodology and time frame), research results

Compulsory literature:

1. Martin, B., Hanington, B. (2012), Universal Methods of Design, , Beverly, MA: Rockport Publisher
2. Sidles, C. (2000), Graphic Idea Resource: Prepress, Seattle, Gloucester

Additional literature:

Number of lectures: 20

ECTS: 5

Teaching quality control:

Scientific paper in a relevant journal

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Maja Brozović, full professor

E-mail: maja.brozovic@grf.hr

Work institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Maja Brozović, PhD, was born on 20 May 1965 in Zagreb. She graduated from the School of Applied Arts in Zagreb, graphic technology program, in 1984. In 1987 she earned her degree from the Graphic Technology College in Zagreb, and in 1992 she graduated from the Combined program in graphic technology in Zagreb. After completing graduate studies, she took employment with FS, Llc, where she worked as a system engineer for information systems in the field of printing. Her duties also included the education of experts in graphic technology in companies in Croatia and Slovenia for the activities of application of Desktop Publishing system. In 1995 she was appointed expert associate in the course Visual Presentation at the Department of Art History and Graphic Design at the Faculty of Graphic Arts.

She earned her Master's degree in information systems from the Faculty of Organization and Informatics in Varaždin, University of Zagreb, in 1996. The title of her master's thesis was Modification of information in the process of transformation of originals into digital print reproductions, supervised by Professor Vilko Žiljak, PhD. She received her doctoral degree in 2003, by defending the dissertation titled A study of objective reproduction in printing, supervised by Professor Stanislav Bolanča, PhD.

On 15 March 2010 she was appointed associate professor, and on 17 June 2011 she was appointed research fellow. She is the course director in undergraduate, graduate and doctoral programs at the Faculty of Graphic Arts, University of Zagreb.

Date of last academic appointment to the teaching and research position: June 9th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Brozović, M.; Mikota, M.; Pavlović, I., (2010.), Steadfastness of Colours of Outdoor Advertising Media, Beč : DAAAM International Vienna
2. Brozović, M.; Jurković, V.; Kovačević, D., (2011.), Guidelines for forming communication signs in the area of safety, Tehnički vjesnik, 18, 91-94.
3. Kovačević, D.; Brozović, M.; Bota, J., (2014), Legibility of Pictograms on Coloured Surfaces Under Different Illuminants, Acta graphica, 25, 1-10.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Studij tehnoloških čimbenika grafičkog dizajna za sustavno unapređenje kvalitete (project manager: Stanislav Bolanča), Ministry of Science, Education and Sports, 128-1281955-1962
2. Evaluacija kvantitavnih i kvalitativnih kriterija procesa grafičke reprodukcije (project manager: Nikola Mrvac), Ministry of Science, Education and Sports ,128-1281955-1960

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **GRAPHIC STRUCTURES**

Code: **PDS 304**

Semester: II. Semester - Graphic Design

Teacher: Maja Brozović, full professor

Course Summary

The course contents refer to measurability of graphic structures and research of their formal-semantic relations. Relations in semiological terminology, known as relation between sign and meaning, are limited here to graphic structures and informative criterion. We are dealing with the analysis of graphic form structurality levels such as letters, numbers, and their accurately specified fonts, as well as signs of other formal language. Other procedures, next to Gestalt method of determining structurality level, are used to measure the form complexity. With so-called developmental forms, there results point to the area of cognitive-educational interest in relation to the threshold of graphic structure articulation. With results of pedagogic experiences, we are talking about readability as optimal size of the whole set by formal structure. On the other hand, we are talking about the graphic medium and its graphic structure, about tolerance and successfulness of a certain design.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to create and evaluate new insights in the field of research
- ability to create, analyze and evaluate new methods, instruments, tools and materials
- competences to conduct socially accepted communication and cooperation with international groups
- development of professionalism and ethical authority
- commitment to conduct research and develop new ideas
- social responsibility in the implementation of research results

Description of teaching methods:

Definition of course and aim of research, research plan (methodological and chronological), research results

Compulsory literature:

1. Carter, R., Day, B., Meggs, P. (2002) Typographic Design: Form and Communication, New Jersey, John Willey & Sons
2. Jones, O. (1987) The Grammar of Ornament: Colour Plates, Dover Publication

Additional literature:

Number of lectures: 30

ECTS: 7

Teaching quality control:

Research topic must be elaborated in the form of a publication in a relevant journal

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Maja Brozović, full professor

E-mail: maja.brozovic@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Maja Brozović, PhD, was born on 20 May 1965 in Zagreb. She graduated from the School of Applied Arts in Zagreb, graphic technology program, in 1984. In 1987 she earned her degree from the Graphic Technology College in Zagreb, and in 1992 she graduated from the Combined program in graphic technology in Zagreb. After completing graduate studies, she took employment with FS, Llc, where she worked as a system engineer for information systems in the field of printing. Her duties also included the education of experts in graphic technology in companies in Croatia and Slovenia for the activities of application of Desktop Publishing system. In 1995 she was appointed expert associate in the course Visual Presentation at the Department of Art History and Graphic Design at the Faculty of Graphic Arts.

She earned her Master's degree in information systems from the Faculty of Organization and Informatics in Varaždin, University of Zagreb, in 1996. The title of her master's thesis was Modification of information in the process of transformation of originals into digital print reproductions, supervised by Professor Vilko Žiljak, PhD. She received her doctoral degree in 2003, by defending the dissertation titled A study of objective reproduction in printing, supervised by Professor Stanislav Bolanča, PhD.

On 15 March 2010 she was appointed associate professor, and on 17 June 2011 she was appointed research fellow. She is the course director in undergraduate, graduate and doctoral programs at the Faculty of Graphic Arts, University of Zagreb.

Date of last academic appointment to the teaching and research position: June 9th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Brozović, M.; Mikota, M.; Pavlović, I., (2010.), Steadfastness of Colours of Outdoor Advertising Media, Beč : DAAAM International Vienna
2. Brozović, M.; Jurković, V.; Kovačević, D., (2011.), Guidelines for forming communication signs in the area of safety, Tehnički vjesnik, 18, 91-94.
3. Kovačević, D.; Brozović, M.; Bota, J., (2014), Legibility of Pictograms on Coloured Surfaces Under Different Illuminants, Acta graphica, 25, 1-10.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Studij tehnoloških čimbenika grafičkog dizajna za sustavno unapređenje kvalitete (voditelj prof.dr.sc. Stanislav Bolanča) MZOŠ br. 128-1281955-1962
2. Evaluacija kvantitavnih i kvalitativnih kriterija procesa grafičke reprodukcije (voditelj prof.dr.sc. Nikola Mrvac) MZOŠ br. 128-1281955-1960

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0

Course

Name of Course: **COLORIMETRIC METHODS IN GRAPHIC REPRODUCTION**

Code: **PDS 305**

Semester: II. Semester - Graphic Design

Teacher: Nina Knešaurek, associate professor

Course Summary

Colour determination. Physical stimulus. Light source. Hurich- Jameson's theory of colour vision. Abnormal colour vision. Metamerism. Systems of describing colours based on opinion, perception and colour equalisation. Unique colour spaces. The basic principles of colour measuring. Visual evaluation of the colour. Instrumental colour measuring. Geometry of colour measuring. Measuring of different types of substrates. Problem of colour differences. Perceptibility and acceptability of colour differences. Expressions for determining the total colour difference.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- acquisition of specific knowledge in the field of colorimetric method of measuring color
- advanced knowledge of the science of color and the human visual system.
- Ability to assess, evaluate and analyze factors that influence the perception of color

Description of teaching methods:

Lectures and tutorials

Compulsory literature:

1. B.Judd, G.Wyszecki, Color in Business Science and Industry, John Wiley and Sons, New York, 1975.
2. G.Wyszecki, W.S.Stiles, Color Science Concepts and Methods, Quantitative Data and Formulae, John Wiley and Sons, New York, 1982.
3. J.M.Adams, Optical Measurements in the Printing Industry, Pergamon Press, Oxford, 1965.
4. W.G.Hunt, Measuring Colour, John Wiley and Sons, New York, 1989.

Additional literature:

1. W.Schultze, Farbenlehre und Farbmessung, Springer Verlag, Berlin, 1975.
2. F.Grum, C.J.Bartleson, Color Measurement, Academic Press, New York, 1980.
3. R.S.Berns, Principles of Color Technology, John Wiley and Sons, New York, 2000.

Number of lectures: 15

ECTS: 4

Teaching quality control:

Seminar in a form of a practical solution for potential colorimetric problems in the industry. Oral exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Nina Knešaurek, associate professor

E-mail: nina.knesaurek@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Nina Knešaurek was born in Zagreb where she attended elementary and secondary school. After high school she enrolled to the Faculty of Technology at the University of Zagreb, having graduated in 1977. At the same faculty, she was admitted to postgraduate study. With her Master's thesis “Color study in graphic reproduction“ she earned her Master's degree in 1985 supervised by prof. Dorotheja Turkalj, PhD. Her doctoral dissertation, under supervision of prof. Dorotheja Turkalj, PhD, earned her a PhD degree in 1998 at the Faculty of Chemical Engineering and Technology at the University of Zagreb.

Date of last academic appointment to the teaching and research position: November 16th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Kulčar, Rahela; Klanjšek Gunde, Marta; Knešaurek, Nina.Dynamic Colour Possibilities and Functional Properties of Thermochromic Printing Inks, Acta graphica, revija za grafičku tehnologiju, inžinjerstvo i dizajn. 23 (2012) ; 25-3
2. Kulčar, Rahela; Friškovec, Mojca; Klanjšek Gunde, Marta; Knešaurek, Nina. Dynamic colorimetric properties of mixed thermochromic printing inks. // Coloration technology. 127 (2011) , 6; 411-417

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Key researcher: Marta Klanjšek Gunde, Branka Lozo
   Project title: New graphic applications with chromogenic printing inks
   National Institute of Chemistry, Ljubljana, The Faculty of Graphic Arts, Zagreb

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 3

Course

Name of Course: **DESIGN THEORY**

Code: **PDS 306**

Semester: II. Semester - Graphic Design

Teacher: Diana Milčić, full professor

Course Summary

Design theory and methodology. Function of design as a communication medium. Features and application of design theory. Basics of form theory, theory of signs. Multidimensionality of design. Communication theory and design. Interdisciplinary design features: quality, marketing, ergonomics, usage value, analysis of value, durability, style, graphics. What is industrial design? Modern products' development. The role of design in products' development. Methodology of integrated products' development. Planning on product requirements and management. QFD (Quality Function Deployment) methodology and its usage. CFD (Concurrent Function Deployment) methodology and application. Product and process systematisation. Critical design goals in product development: usefulness of the product, look and shape of the product, possibility for maintenance, cost of products, usability, communication. Classification of significant methods of design. Criteria and evaluation of design's success.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to plan design process in view of interdisciplinary design features
- ability to compare methods of design and choose the adequate method
- ability to combine different methods of design during the design process
- familiarization with research methods in the process of evaluation
- critical evaluation of proposed solutions
- substantiated presentation of solutions

Description of teaching methods:

Tutorials

Compulsory literature:

1. Branch, M. R., (), Instructional Design: The ADDIE Approach, Springer, New York
2. Kumar, V. (2013), 101 Design Methods, Wiley & Sons Inc., New Jersey

Additional literature:

1. Boyd, D., Goldenberg, J. (2013), Insider the Box, Simon & Schuster, New York
2. Chaffee, J. (2009), Thinking Critically, Wadsworth, Cengage Learning,

Number of lectures: 20

ECTS: 5

Teaching quality control:

Seminar paper based on the scientific research study

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Diana Milčić, full professor

E-mail: dmilcic@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Diana Milčić graduated at the Faculty of Mechanical Engineering and Naval Architecture in 1989 at the study course of mechanical engineering, programme type Mechanical Engineering Constructions.

Upon completion of studies, Diana worked at „Končar – Generatori" in generator constructions using programme package CADDS Computervision.

From 1 March 1993 to 1 June 1994 she worked at the Faculty of Mechanical Engineering and Naval Architecture as part-time research assistant at the Department of elements of machines and constructions.

From 1 June 1994 to 1 October 1996 she worked at „TKT-Toplota" in construction and management of production.

From 1 October 1996 to 1 February 2002 she worked at the Faculty of Mechanical Engineering and Naval Architecture on a research project „Dynamical analysis, synthesis and control of complex movements of biomechanical and technical systems"

Since 1 February 2002 she has worked at the Faculty of Graphic Arts.

In 1997 Diana earned her Master's degree at the Faculty of Mechanical Engineering and Naval Architecture, and she earned her PhD degree in May 2001, also at the Faculty of Mechanical Engineering and Naval Architecture at the University of Zagreb.

Diana is project manager of „Standardisation of ecologically acceptable processes of graphic communications" 128-1281955-1951, funded by the Ministry of science, education and sports.

Diana collaborated in the realisation of a bilateral project „Electrochemical testing and corrosion resistance of aluminium and its oxides and application in print form for planographic printing „

Date of last academic appointment to the teaching and research position: July 8th 2014

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Mahović Poljaček, S., Tomašegović, T., Cigula, T., Gojo, M., Milčić, D., (2014), Formation of the Printing Elements in the Photopolymer Material Used in Flexography, Key Engineering Materials. (611-612), 883-891
2. Donevski, D., Milčić, D., Borković, J., (2013), Properties of Printer Calibration Targets. The International Circle of Educational Institutes for Graphic Arts: Technology and Management, 6, 70-79

3. Šarčević, I., Banić, D., Milčić, D., (2013), Colorimetric Differences on Wood Susbstrate due to Varnishing Influence, Acta technica corviniensis - Bulletin of Engineering. 1, (1), 91-94
4. Donevski, D., Milčić, D., Šarčević, I., (2012), Assessing RGB Device Calibration Control Level, Tehnicki Vjesnik-Technical Gazette, 19, (1), 607-610
5. Donevski, D., Milčić, D., Banić, D., (2010), Effect of data scaling on color device model fitting, Journal of Industrial Engineering and Management, 3, 399-407
6. Donevski, D., Milčić, D., Banić, D., (2010), Increasing the Accuracy of Colour Reproduction System Evaluation by Proper Sampling, Acta graphica. 22, (3-4), 1-5

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Art director on EU project „In Public, In Particular" financed bay Creative Europe - Culture Sub-programme 2014-2020
2. Associate on a project financed by the University of Zagreb „Optimizacija radnih procesa u izradi ambalaže" 2015
3. Associate on a project financed by the University of Zagreb „Metode evaluacije i unaprjeđenja sustava pakiranja" 2014
4. manager of a project financed by the University of Zagreb „Razvoj sustava ekološki prihvatljivijih modela pakiranja" 2013 / 2014
5. manager of a national scientific project „Standardizacija ekološki prihvatljivih procesa grafičkih komunikacija", 128-1281955-1951., 2007 -2013
6. associate on a national scientific project „Virtualna trodimenzijska primjenjena atropologija" 120-1962766-3109., 2007 – 2013
7. associate on a bilateral Slovenian-Croatian scientific project "Elektrokemijska ispitivanja i korozijska otpornost aluminija i njegovih oksida i primjena na tiskovnoj formi za plošni tisak", 2010 - 2011

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 2

Course

Name of Course: **USER INTERFACE DESIGN**

Code: **PDS 307**

Semester: II. Semester - Graphic Design

Teacher: Diana Milčić, full professor

Course Summary

Ergonomics in computer science. Ergonomics as a science observing work, work organisation and work safety. Review of existing norms in ergonomics related to computer science and their application. Ergonomics in design and modelling. The interrelation: human – computer – environment. Analysis of the environment of the end user of the computer and their tasks. Ergonomic principles in creating workplaces and work environment. Ergonomics of computer equipment. Building a user interface, dialogue user – computer (Human Computer Interaction), graphic user interfaces, built-in forms of assistance, programme documentation, means of serving. 3D user interfaces. Ways and possibilities for end user's education and their self-education. Theory and design methodology. Function of design as a communication medium. Features and application of design theory. Basics of form theory, theory of signs. Multidimensionality of design. Communication theory and design. Interdisciplinary design features: quality, marketing, ergonomics, usage value, analysis of value, durability, style, graphics.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- ability to plan the process of user interface design based on user's needs and specific purpose of the design
- ability to combine different design principles in the process of user interface design
- familiarization with research methods used in the process of evaluation of user interfaces
- critical evaluation of proposed solutions
- substantiated presentation of solutions

Description of teaching methods:

Tutorials

Compulsory literature:

1. Goodwin, K., (2009), Designing for the Digital Age, Indianapolis, Wiley Publishing Inc.
2. Jerald, J. (2015), Human-Centered Design for Virtual Reality, ACM Books series,Morgan & Claypool Publishers,
3. Bennett, K. B., Flach J. M. (2011), Display and Interface Design, Taylor & Francis Group, Boca Raton

Additional literature:

1. Chapman, N., Chapman, J., (2004), Digital multimedia, Wiley & Sons Inc., New Jersey

Number of lectures: 20

ECTS: 5

Teaching quality control:

Seminar paper based on the scientific research study

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Diana Milčić, full professor

E-mail: dmilcic@grf.hr

Work institution: University of Zagreb Faculty of Graphic Arts

Diana Milčić graduated at the Faculty of Mechanical Engineering and Naval Architecture in 1989 at the study course of mechanical engineering, more concretely Mechanical Engineering Constructions.
Upon completion of studies, Diana Milčić worked at „Končar – Generatori" in generator constructions using programme package CADDS Computervision.
From 1 March 1993 to 1 June 1994 she worked at the Faculty of Mechanical Engineering and Naval Architecture as part-time research assistant at the Department of elements of machines and constructions.
From 1 June 1994 to 1 October 1996 she worked at „TKT-Toplota" in construction and management of production.
From 1 October 1996 to 1 February 2002 professor Milčić worked at the Faculty of Mechanical Engineering and Naval Architecture on a research project „Dynamical analysis, synthesis and control of complex movements of biomechanical and technical systems"
Since 1 February 2002 she has worked at the Faculty of Graphic Arts.
In 1997 Diana earned her Master's degree at the Faculty of Mechanical Engineering and Naval Architecture, and she earned her PhD degree in May 2001, also at the Faculty of Mechanical Engineering and Naval Architecture at the University of Zagreb.
Diana Milčić is project manager of „Standardisation of ecologically acceptable processes of graphic communications" 128-1281955-1951, funded by the Ministry of science, education and sports.
Prof. Milčić collaborated in the realisation of a bilateral project „Electrochemical testing and corrosion resistance of aluminium and its oxides and application in print form for planographic printing".

Date of last academic appointment to the teaching and research position: July 8th 2014

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Mahović Poljaček, S., Tomašegović, T., Cigula, T., Gojo, M., Milčić, D., (2014), Formation of the Printing Elements in the Photopolymer Material Used in Flexography, Key Engineering Materials. (611-612), 883-891
2. Donevski, D., Milčić, D., Borković, J., (2013), Properties of Printer Calibration Targets. The International Circle of Educational Institutes for Graphic Arts: Technology and Management, 6, 70-79

3. Šarčević, I., Banić, D., Milčić, D., (2013), Colorimetric Differences on Wood Susbstrate due to Varnishing Influence, Acta technica corviniensis - Bulletin of Engineering. 1, (1), 91-94
4. Donevski, D., Milčić, D., Šarčević, I., (2012), Assessing RGB Device Calibration Control Level, Tehnicki Vjesnik-Technical Gazette, 19, (1), 607-610
5. Donevski, D., Milčić, D., Banić, D., (2010), Effect of data scaling on color device model fitting, Journal of Industrial Engineering and Management, 3, 399-407
6. Donevski, D., Milčić, D., Banić, D., (2010), Increasing the Accuracy of Colour Reproduction System Evaluation by Proper Sampling, Acta graphica. 22, (3-4), 1-5

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

- „Art director" on EU project „In Public, In Particular" financed by Creative Europe - Culture Sub-programme 2014-2020
- Associate on a project financed by the University of Zagreb „Optimizacija radnih procesa u izradi ambalaže" 2015
- associate on a project financed by the University of Zagreb „Metode evaluacije i unaprjeđenja sustava pakiranja" 2014
- manager of a project financed by the University of Zagreb „Razvoj sustava ekološki prihvatljivijih modela pakiranja" 2013 / 2014
- manager of a national scientific project „Standardizacija ekološki prihvatljivih procesa grafičkih komunikacija", 128-1281955-1951., 2007 -2013
- associate on a national scientific project „Virtualna trodimenzijska primjenjena atropologija" 120-1962766-3109., 2007 – 2013
- associate on a bilateral Slovenian-Croatian scientific project "Elektrokemijska ispitivanja i korozijska otpornost aluminija i njegovih oksida i primjena na tiskovnoj formi za plošni tisak", 2010 - 2011

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 2

Course

Name of Course: **TYPOGRAPHY THEORY**

Code: **PDS 308**

Semester: II. Semester - Graphic Design

Teacher: Klementina Možina, associate professor

Course Summary

The course contents are based on a detailed study of the influence of historical periods and art styles to typography. It introduces typographic rules, valid for writing of some European and world languages. It introduces the role (meaning) of text content in the selection of typography, as well as the methods of readability testing.

A detailed overview of historical period influences, art styles and technological development to typography: early (first) records, manuscript of Roman empire, manuscript to year 1500, renaissance, design of first (early) printed letters, baroque, classicism, industrialisation, post 20th century period, art nouveau, new traditionalism, modernism, postmodernism, typographical galaxy. Microtypography of foreign languages: English (British and American), German, Italian. Influence by information contect to selection of typography: intent, message, usage. Use of different methods of readability testing.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- comprehension and ability to use the methods of critical analysis and development of theories
- appropriate application of typography and readability
- profound knowledge of artistic styles and their influence on typographical interpretation
- skills in using different methods to test readability
- research skills and initiative in the field of typography
- development of critical and self-critical decisions concerning the use of typography for various purposes

Description of teaching methods:

Classes are student-adapted – lectures and/or tutorials

Compulsory literature:

1. BRINGHURST, R., (2015), The Elements of Typographic Style, Vancouver, Hartley & Marks.
2. BUTCHER, J., DRAKE, C., LEACH, M., (2007), Butcher's Copy-editing, Cambridge University Press, Cambridge.
3. DOWDING, G., (1998), An Introduction to the History of Printing Types, London, The British Library & Oak Knoll Press.
4. FELICI, J., (2003), The Complete Manual of Typography, Berkeley, Adobe Press.
5. GILL, E., (2015), An Essay on Typography, London, Lund Humphries.
6. KINROSS, R., (1992), Modern Typography: An Essay in Critical History, London, Hyphen press.
7. MORISON, S., (1999), Tally of Types, Boston, David R. Godine.

8. MOŽINA, K., (2003), Knjižna tipografija, Ljubljana, Filozofska fakulteta in Naravoslovnotehniška fakulteta.
9. MOŽINA, K., (2009), Mikrotipografija, Ljubljana, Naravoslovnotehniška fakulteta.
10. The Chicago Manual of Style, (2003), Chicago, The University of Chicago Press.
11. TRACY, W., (2003), Letters of credit: A view of type design, London, Gordon Fraser Gallery.
12. UPDIKE, D. B., (1980), Printing Types, London, The British Library & Oak Knoll Press.
13. WILLBERG, H. P., FORSSMAN, F., (2005), Lesetypografie, Mainz, Hermann Schmidt.

Additional literature:

1. ABADI, R. V., (2006), Vision and eye movements, Clinical and experimental optometry, no. 89, str. 55–56.
2. DYSON, M. C., (2004), How physical text layout affects reading from screen, Behavior & information technology, vol. 23, no. 6, str. 377–393.
3. FENG, G., (2009), Time course and hazard function: A distributional analysis of fixation duration, Journal of eye movement research, vol. 3, no. 3, str. 1–23.
4. FRANKEN, G., PODLESEK, A., MOŽINA, K., (2015), Eye-tracking study of reading speed from LCD displays: influence of type style and type size, Journal of eye movement research, vol. 8, no. 1, str. 1–8.
5. LEGGE, G. E., BIGELOW, C. A, (2011), Does print size matter for reading? A review of findings from vision science and typography, Journal of vision, vol. 11, no. 8, str. 1–22.
6. LUND, O., (1997), Why Serifs are (still) Important, Typography Papers, no. 2, str. 91–104.
7. PETERSON, K. B., JORDAN, T. R., (2010), Effects of increased letter spacing on word identification and eye guidance during reading, Memory & cognition, vol. 38, no. 4, str. 502–512.
8. RAYNER, K., TIMOTHY, J., SLATTERY, T. J., BÉLANGER, N. N., (2010), Eye movements, the perceptual span, and reading speed, Psychonomic bulletin and review, vol. 17, no. 6, str. 834–839.

Number of lectures: 30

ECTS: 7

Teaching quality control:

Students prepares a research seminar paper and he/she must defend it.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Klementina Možina, associate professor

E-mail: klementina.mozina@ntf.uni-lj.si

Work institution:

University of Ljubljana, Faculty of Natural Sciences and Engineering, Department of Textiles, Graphic Arts and Design, Chair of Information and Graphic Technology, Chair of Information and Graphic Arts Technology

Short CV:

Klementina Možina was born on 11 June 1971, in Ljubljana. She attended elementary and high school in Ljubljana. After graduating from high school she enrolled in the Faculty of Graphic Arts in Zagreb, from which she graduated in 1993. In 1994 she enrolled in the Master's programme at the Faculty of Arts in Ljubljana, and received her Master's degree in 1997. Two years later she enrolled in the doctoral program at the same faculty. During the preparation of her doctoral dissertation in 2000, she studied in England for three months at the University of Reading, Department of Typography and Graphic Communication. She defended the dissertation titled Zgodovinski razvoj knjižne tipografije in 2001. In 2004 she was appointed assistant professor.
After she graduated from university she worked at the Mladinska knjiga printing house for 5 years (until 1998); first as a technologist, then as a project manager, and as the manager of the department of production planning for the final three years. Since 1998 she has worked at the Faculty of Natural Sciences and Engineering, Chair of Information and Graphic Technology. As associate professor, she teaches the following courses: Tipografija, Tipografija v različnih medijih, Tipografski elementi, Tipografsko načrtovanje, Teorija tipografije. From 2005 to 2006 she also taught the courses Vodenje grafične proizvodnje and Grafični inženiring.

Date of last academic appointment to the teaching and research position: October 25th 2012

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. KOVAČEVIĆ, D., BROZOVIĆ, M., MOŽINA, K., (2016) Improving visual search in instruction manuals using pictograms, Ergonomics, 15 str., doi: 10.1080/00140139.2016.1142123.
2. FRANKEN, G., PODLESEK, A., MOŽINA, K., (2015), Eye-tracking study of reading speed from LCD displays: influence of type style and type size, Journal of eye movement research, vol. 8, no. 1, str. 1–8.
3. MOŽINA, K., MOŽINA, K., BRAČKO, S., (2013), Non-invasive methods for characterisation of printed cultural heritage, Journal of cultural heritage, vol. 14, no. 1, str. 8–15.
4. BLAZNIK, B., MOŽINA, K., BRAČKO, S., (2013), Stability of ink-jet prints under influence of light, Nordic Pulp and Paper Research Journal, vol. 28, no. 1, str. 111–118.
5. MOŽINA, K., RAT, B., MAJNARIĆ, I., BERNAŠEK, A., (2013), Visibility of graphic elements on textiles, Industria textilæa, vol. 64, no. 5, str. 266–272.
6. VILAR, A., MOŽINA, K., PAVKO-ČUDEN, A., (2013), Tipografija in logotipi v pletenih strukturah = Typography and logos in knitted structures, Tekstilec, vol. 56, no. 1, str. 34–46.
7. MOŽINA, K., ZIDAR, M., HORVAT, M., (2012), Typography and graphic design in newspaper Slovenec, Papiripar, vol. 56, no. 4, str. 20–24.
8. RAT, B., MOŽINA, K., BRAČKO, S., PODLESEK, A., (2011), Influence of temperature and humidity on typographic and colorimetric properties of ink jet prints, Journal of imaging science and technology, vol. 55, no. 5, str. 050607/1-050607/8.
9. RAT, B., MAJNARIĆ, I., MOŽINA, K., (2011), Visibility of care labelling code symbols, Tekstil, vol. 60, no. 6, str. 5251–257.

10. MOŽINA, K., (2011), Reprints of Jože Plečnik's fairytales Makalonca, Acta graphica, vol. 22, no. 3/4, str. 85–92.
11. MOŽINA, K., (2011), Mikrotipografija arhitekta Jožeta Plečnika, Knjižnica, vol. 55, no. 4. str. 147–161.
12. PUŠNIK, N., KOVAČEVIĆ, D., BROZOVIĆ, M., MOŽINA, K., (2014), Is legibility of typefaces designed for screen use the same for different languages?. In: 41th International research conference iarigai, Swansea, United Kingdom, September 2014. ENLUND, N., LOVREČEK, M. (eds.). Advances in printing and media technology : [proceedings of the 41th International research conference iarigai, Swansea, United Kingdom, September 2014]. Vol. 41. Darmstadt: International Association of Research Organizations for the Information, Media and Graphic Arts Industries, 2014, str. 117–122.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

J5-6814, Explaning effective and efficient problem solving of the triplet relationship in science concepts representations, 1. 7. 2014–30. 6. 2017

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 3

Course

Name of Course: **DIGITAL SPACE DESIGN**

Code: **PDS 309**

Semester: II. Semester - Graphic Design

Teacher: Jesenka Pibernik, associate professor

Course Summary

The course observes theoretical and practical foundations of scientific research of digital media. Due to digital technology, traditional boundaries among: games, learning and story; drama, informative and narrative forms; broadcasting (TV, radio) and archive (books, video tapes, CD, DVD) media, between author and audience, are increasingly losing their meaning. Therefore, designers are left facing a demanding job of researching and creating a wide range of technical, representational and artistic possibilities of new media as well as possibilities for transmission of knowledge. The study of these new forms, from the standpoint of new authors as well as the standpoint of the audience requires the convergence of methods of several traditional disciplines and defining new methodologies in research and praxis. The transition from the so-called Guttenberg into the information galaxy also presupposes the shift from the mechanical, subject oriented designer praxis to the praxis characterised by a system that gives the control to users instead of a designer, emphasises the importance of society (social network), recognizes the importance of the media convergence and requires joint work of interdisciplinary teams so as to solve the complex problems of the present day. In the category of "digital space", its construction and deconstruction is achieved by various methods such as the mobility of the camera and frame, opposition and superposition. Spatio-temporal design of the graphic message is used for the purpose of improving the interaction between the viewer and the message; increasing the motivation and the quality of experience, branding and development of the new communication strategies. However, "design of the digital space" is not only a tool but also means that can generate new design ideas and create unexpected forms, textures and samples, with the help of graphic programmes and algorithms. Therefore, computers can be used as a mediator in the process of connecting different parts of actual, physical and virtual worlds.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- independence in gathering knowledge
- new insights in the field of research based on synthesis and analysis
- familiarization with research methodology and critical assessment of the quality of digital storage knowledge in the field of user-oriented design
- social responsibility, ethical values acquired while actively participating in the projects and interacting with other members of the multidisciplinary and international scientific community

Description of teaching methods:

The course is conceived as a set of tutorials. Students are granted access to all equipment necessary for scientific research, provided with suggestions to problems and advised as to the qualitative and quantitative methods required for the type of research to be carried out.

The course emphasizes practical work on scientific and research interdisciplinary projects and encourages international cooperation with other institutions of higher education and laboratories.

Compulsory literature:

1. Jerald J. (2016): The VR Book, User centered design for Virtual Reality, ACM Books.
2. Woolman M., Bellantoni J. (2000): Moving Type. Designing for Time and Space”. Rotovision SA, Crans-Pres-Celigny.
3. Pibernik J. (2006) Dizajn digitalnog prostora, Hrvatska sveučilišna naklada, Zagreb.

Additional literature:

1. J. Preece, Y. Rogers, and H. Sharp (2002) Interaction Design: Beyond Human-Computer Interaction. Wiley & Sons.
2. C. Ware (2012) Information visualization: perception for design, Third edit. Waltham, MA: Elsevier.

Number of lectures: 20

ECTS: 5

Teaching quality control:

Seminar paper or a scientific paper for relevant journals

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Jesenka Pibernik, associate professor

E-mail: jpiberni@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Associate professor Jesenka Pibernik graduated at the Faculty of Architecture of the University of Zagreb in 1985. She earned her Master's degree in 1992 in the USA, University of Texas, Austin (supervisor: Charles Moore, AIA). After graduation she stayed in the USA and was associate on several architecture projects. Since 1995 she has lived in Zagreb.

Jesenka Pibernik was awarded several architecture awards and recognitions in architecture competitions and her work was displayed at several exhibitions, at Zagreb Salon, amongst other.

In 1998, after one-year part-time job, Jesenka Pibernik was employed at the Faculty of Graphic Arts at the University of Zagreb. She earned her PhD degree in 2003 at the Faculty of Architecture at the University of Zagreb. She co-authored the university course book „Digital space design“ published by Croatian University Press. Jesenka Pibernik teaches undergraduate, graduate and postgraduate courses at the Faculty of Graphic Arts at the University of Zagreb within the Department of Art History and Graphic Design and she also holds the position of Dean of Finance and General Affairs.

Jesenka has participated actively in several research projects in Croatian, in an EU-funded project within the COST program, as well as in a project within the framework of Science and Innovation Investment Fund. Her professional interests include: graphic design, web design, mobile graphics, design of communication services for people with complex communicational needs, user experience.

Date of last academic appointment to the teaching and research position: Marth 14th 2010

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Poljičak, A. Dolić, J.; Pibernik, J. (2016): An optimized Radial Basis Function model for color characterization of a mobile device display. Displays. 41 ; 61-68.
2. Dolić, J.; Pibernik, J.; Majnarić, I. (2014): Influence of UV Varnish Pattern Effect on Print Quality. Journal of Imaging Science and Technology. 58
3. Pibernik, J.; Dolić J., Kanižaj, B. (2013): „What is creativity in web portfolio design" Digital Creativity 25. 126-139.
4. Cvitić, F.; Pavčević, O. M.; Pibernik, J. (2015):Two Messages out of One 2D Matrix Bar Code. KSII Transactions on internet and information systems.
5. Dolić, J., Pibernik J., Car Ž. (2013): Design and Developement of Symbol Based Services for Persons with Complex Communication Needs. Acta Graphica 24. 1-2.
6. Cvitić F., Pibernik J. (2014):Decoding Different Patterns in Various Grey Tones Incorporated in the QR Code. Acta graphica. 25 , 1-2; 11-22.
7. Pibernik J.; Dolić J.; Dilberović I. (2011): „Proces dizajna T-majica tehnikom digitalnog tiska na tekstilu". Tekstil : časopis za tekstilnu tehnologiju i konfekciju. 60 , 10; 504-511.

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

Scientific projects:

1. Project „Evaluacija kvantitavnih i kvalitativnih kriterija procesa grafičke reprodukcije" MZOŠ br. 128-1281955-1960, project manager Nikola Mrvac
2. Project „ICT sustavi za osobe sa složenim komunikacijskim potrebama", financed by the University of Zagreb
3. COST project Action IC1003: European Network on Quality of Experience in Multimedia Systems and Services (QUALINET) area: Information and communication technology
4. Project EuropeAid/131920/M/ACT/HR, Science and Innovation Investment Fund Grant Scheme, Title: „ICT Competence Network for Innovative Services for Persons with Complex Communication Needs"

University of Zagreb – research support program

1. Metode evaluacije grafičkih korisničkih sučelja aplikacija namijenjenih korisnicima sa kompleksnim komunikacijskim potrebama. 2013
2. Visokotehnološka rješenja za razvoj jezičnih sposobnosti kod složenih komunikacijskih potreba. 2015

Art projects:

1. Creative Europe Project- Culture Sub-programme (2014-2020) – 'Support to European cooperation projects – Smaller scale cooperation projects projects' – Call for proposals EACEA 32/2014 – Budget 2015.“ In Public In Particular

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 3

Course

Name of Course: **SECURITY PRINTING**

Code: **PDS 310**

Semester: II. Semester - Graphic Design

Teacher: Ivana Žiljak Stanimirović, associate professor

Course Summary

Design of graphic products with visible and invisible security elements. Safety raster elements, infrared design, holography, dynamic and three-dimensional graphics, microtext and safety typography, safety encryption, safety colourful barcode, individualisation, digital databases, softwares for creating and analysing of the safety graphics, instruments for verifying originals and detecting counterfeits. Permeation of the previous scientific methods with design on theoretical and practical levels. Applications on all graphic products with an emphasis on the design of gilts, documents, packaging (all types of packaging, drugs packaging). Protection of graphic products, brands. Designing graphics with regard to different materials; cardboard, paper, cotton, linen, silk (book covers) and planning design for different techniques of performance. Possibility to use the conventional techniques for printing while implementing safety screening in a way that allows planning premium protection. Design considering the colours, process and spot colours in the safety press with prompt in the visible and invisible part of the spectrum – UV and infrared area of wavelengths.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- advanced competences in the field of security printing
- specialized skills and expertise necessary for innovative approaches in critical problem-solving
- independence, scientific and professional integrity

Description of teaching methods:

Depending on the number of students assigned for the doctoral course, teaching will be performed as planned by the programme or in form of tutorials.

Compulsory literature:

1. I. Žiljak, K. Pap, J. Žiljak Vujić: "Infrared Design", FS, Zagreb, (2008), ISBN 978-953-7064-09-9 , science book, international review.
2. K. Pap, J. Žiljak Vujić, I. Žiljak: "Design of Digital Screening", FS, Zagreb, (2008), ISBN 978-953-7064-10-5 science book, international review.
3. I. Žiljak, K. Pap, J. Žiljak Vujić: "Infrared Security Graphics", FotoSoft, Zagreb, (2009), ISBN 978-953-7064-11-2 science book, international review

Additional literature:

1. (2011. – 2015) Conference proceedings, 12-19. "Blaž Baromić" International conference, Croatian Association of Graphic Engineers
2. (2011. – 2015) Conference proceedings, International conferences PRINTING & DESIGN, FS, Fotosoft,

3. D.Pizzanelli: The Future Of Anti-Counterfeiting, Brand Protection And Security Packaging, Forecasts To 2014. Pira International Ltd. 2010.

Number of lectures: 20

ECTS: 5

Teaching quality control:

Exam is taken in the given timeframe.

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Ivana Žiljak Stanimirović, associate professor

E-mail: ivana.ziljak.stanimirovic@grf.hr

Work Institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Ivana Žiljak Stanimirović, PhD, Assistant Professor at the Faculty of Graphic Arts in Zagreb, was born in 1978 in Zagreb. She finished elementary school and high school in Zagreb, and in 1996 she enrolled in the Design School at the Faculty of Architecture in Zagreb. She graduated in January 2001.

Since 2001 she has worked as a research fellow at the Faculty of Graphic Arts, where she participated in scientific work and instruction. In 2002 she enrolled in the postgraduate studies at the Faculty of Graphic Arts in Zagreb.

In 2005 she defended her Master's thesis in engineering sciences, field of graphic technology , titled „Graphics of documents with spot colours from the ultraviolet area“ at the Faculty of Graphic Arts in Zagreb, supervised by Darko Agić, PhD.

In 2007 she defended her doctoral dissertation titled „Designing security graphics with variable colours of digital printing in the visible and invisible part of the spectrum“ at the Faculty of Graphic Arts, University of Zagreb, supervised by Darko Agić, PhD.

In 2009 she was appointed research associate in the scientific discipline of engineering sciences, field of graphic technology.

She was appointed assistant professor in 2009, and senior research associate in 2010.

In 2010 she was awarded the National Award for Science and the Award for Excellence in Science of the Ministry of science, education and sports o the Republic of Croatia.

Ivana and her associates received 60 prestigious awards for discoveries in the area od security graphics design and INFRAREDESIGN, in Croatia and abroad, from the USA to Malaysia.

The areas of work of Ivane Žiljak Stanimirović, PhD, include the theoretical and practical improvement of design and printing technology with emphasis on security and security graphics using ultraviolet and infrared colours, micro-lenses and holography. She is working in the area of typography and individualized grating elements. Her latest findings are related to programming visible and invisible security codes with multimedia application.

She has been a professional member of the Croatian Designers Society since 2000.
She has applied her scientific findings in many graphic solutions. She has presented her work at 20 selected international group exhibitions in Croatia and abroad. She has held 10 solo exhibitions, the most significant being the INFRAREDESIGN exhibitions in Croatia and abroad.
Together with her associates she has written three books in English and Croatian that have been internationally reviewed:"Infrared Design", "Design of Digital Screening" and "Infrared Security Graphics" that serve as a basis for courses on security graphics. She has held more than 40 lectures at international scientific conventions and 5 lectures as a a guest lecturer. Her lecture titled „Infrared Security Print: New Method Of Infrared Security Printing" (PIRA, Vilnius, 2009) was judged the greatest novelty in graphic technology of security printing. Two years later she was the ambassador and guest lecturer at the security printing conference titled "10th International Conference on Security Printing & Alternative Solutions in Central / Eastern Europe and Russia / PIRA International".
For the last five years she has published 8 A category papers entered in Current Contents (4) and SCI, SCI Expanded databases (4), 8 B category papers, 6 C category papers and 18 D category papers in the area of security graphics design that are relevant for the doctoral program area.
As the result of scientific work, together with her associates she has filed three patents from the area of protective security graphics at the State Intellectual Property Office; „Infrared printing with process dyes", "ZRGB apparatus for dual detection", "Protection of portrait reproduction with security portrait".
In the last five years, Ivana and her associates received 60 prestigious awards for INFRAREDESIGN findings at international innovation exhibitions.
In 2013 she successfully completed the supervisor workshop titled „Professionalization of PhD Supervision" at the University of Zagreb, led by dr. Lucas Zinner (University of Vienna).

Date of last academic appointment to the teaching and research position: May 25th 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

14. V. Žiljak, K. Pap, I. Žiljak Stanimirović: "Development of a Prototype for ZRGB Infraredesign Device", Technical Gazette, Vol. 18, No.2, (2011.), p. 153-159, ISSN: 1330-3651 (SCI-Expanded, IF 0.083)
15. V. Žiljak, K. Pap, I. Žiljak Stanimirović, J. Žiljak Vujić: "Managing dual colour properties with the Z - parameter in the visual and NIR spectrum", Infrared Physics & Technology, Vol. 55, Elsevier B.V. (2012.), p. 326-336, ISSN 1350-4495 (CC, SCI, SCI-Expanded, IF 0.932)
16. M. Rudolf, N. Stanić Loknar, I. Žiljak Stanimirović: " Infrared steganography with individual screening shapes applied to postage stamps with security features", Technical Gazette, Acceptance of Article Article No.: TV-20140718121246 (2014.), ISSN: 1330-3651 (SCI-Expanded, IF 0.083)

Scientific papers published in secondary sources

17. M. Turčić, V. Žiljak, I. Ž.–Stanimirović: „Individual Stochastic Screening for the Development of Computer Graphics", Acta Graphica, Vol 22, No 3-4 (2011.), p. 69-78, ISSN 0353-4707 (INSPEC).

18. J. Žiljak Vujić, I. Žiljak Stanimirović, O. Međugorac: „Hidden Information in Visual and Infrared Spectrum“, Informatologia, Vol. 45, No. 2, (2012.), p. 96 - 102, ISSN: 1330-0067 (INSPEC; SCOPUS)
19. I. Žiljak Stanimirović, D. Agić, J. Žiljak Vujić: “Hidden Infrared Image in a Uniform Cmyk Separation Hue”; JGED, Novi Sad: Jurnal of Graphic Engineering and Design, Vol. 3. No2, (2012.), p. 8-12, ISSN 2217-379X
20. D. Agić, I. Stanimirović Žiljak, A. Agić, N. Stanić Loknar: “Degradation of Dual Image for Visual and near Infrared Spectrum at repeated CMYK/RGB Rendering”, Journal of Graphic Engineering and Design, Volume 4 (1), (2013.), p.13-16. ISSN 2217-379X
21. N. Stanić Loknar, I. Žiljak Stanimirović, T. Koren: „Managing pixel deformation with pseudo-random values in infrared security graphics“, TTEM Technics Technologies Education Management, Vol. 8, No. 1., (2013.), p. 59-69, ISSN 1840-1503 (SCI Expanded)
22. I. Žiljak Stanimirović, J. Žiljak Vujić, B. Morić, M. Rudolf: „Security printing with colorant control in the UV, visual and INFRARED spectrum“, TTEM Technics Technologies Education Management, Vol. 8, No.2, (2013.) p. 480-485, ISSN 1840-1503 (SCI Expanded)
23. I. Žiljak Stanimirović; J. Žiljak Vujić; N. Stanić Loknar: „Marking of the camouflage uniform for visual and near infrared spectrum. // TTEM Technics Technologies Education Management. Vol. 8 (2013) , No. 3; 920-926, ISSN 1840-1503 (SCI Expanded)
24. J. Žiljak Vujić, I. Žiljak Stanimirović, S. Bjelovučić Kopilović, M. Friščić: „Zaštita prozirne savitljive plastične ambalaže postupkom INFRAREDESIGN®“, Časopis Polimeri, Vol. 34 (2013) 2-3: p. 42-46, UDK 655.3.066.25:535.62 e-ISSN 1846 – 0828
25. J. Žiljak Vujić, I. Rajković, I. Žiljak Stanimirović: „Simultano video snimanje u vizualnom i infracrvenom spektru proširene V/Z stvarnosti“, Polytechnic & Design Vol. 2, No. 1, 2014. p: 73 – 78, ISSN 1849-1995
26. D. Agić, I. Žiljak Stanimirović, A. Agić; „Appliance of twins as a way for achieving secure hidden imagein infrared technology“, Polytechnic & Design Vol. 2, No. 2, 2014.; P: 143 - 152, ISSN 1849-1995

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

4. National scientific and research program of the Ministry of Science, Education and Sports 2013 – 2014 «Analiza i definiranje optimalnih parametara relevantnih za ispitivanje karakteristika maskirnih boja i uzoraka u UV – VIS do IR spektralnom području», Project manager: associate professor Martinia Ira Glogar
5. National scientific and research program of the Ministry of Science, Education and Sports 2014 «Evaluacija grafičkih parametara u multimedijskom okruženju» Project manager: associate professor Zjakić lgor
6. National scientific and research program of the Ministry of Science, Education and Sports 2015 «Standardizacija grafičkih prikaza u multimedijskom okruženju» Project manager: full professor Nikola Mrvac

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 1

Course

Name of Course: **GRAPHIC COMMUNICATION**

Code: **PDS 311**

Semester: II. Semester - Graphic Design

Teacher: Nikola Mrvac, full professor

Course Summary

Structural and historical laws of communication science. Traditional communication theories, information theory, developmental communication science and graphic communication. What is the subject of research in graphic communication? Graphic communication as a new scientific-praxeological paradigm of developmental communication science at all levels of graphic communication: global, regional, national and local. Graphic communication and communication interaction. Interactive graphic communicational understanding. Social graphic paradigm and communicational system integration. Graphic communication and intercultural strategic interaction. Basic graphic theories of communicating. Graphic-communicational models. Graphic-praxeological communication paradigms. Cultural obstacles and cultural dimensions of graphic communication. Domination of great graphic cultures. Pan-European perspective of graphic media and graphic communication. Graphic communication and messages without words. New graphic technologies, spreading the net of internet citizens and digital communicative graphic future. Alternative communication-graphic channels. Communication science and mutual media culture and graphic communications.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- advanced knowledge in the field of graphic communication
- specialized skills and techniques necessary for critical problem solving by means of innovative approaches
- independence, scientific and professional integrity

Description of teaching methods:

Tutorial

Compulsory literature:

1. Plenković, M., Korenjak M., Korenjak D., (2013), Communication Science in Network Marketing, Maribor, Slovenia, Alma mater Europaea - European Centre
2. Lester P. M., (2014) Visual Communication: Images with Messages 6th Edition, Boston, USA, Wadsworth

Additional literature:

3. (2010 – 2015) Conference proceedings, 12-19. "Blaž Baromić" International conference, Croatian Association of Graphic Engineers
4. (2010 – 2015) Conference proceedings, International conferences PRINTING & DESIGN, FS, Fotosoft,

Number of lectures: 30

ECTS: 7

Teaching quality control:

Final seminar paper and oral exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Nikola Mrvac, full professor

E-mail: nikola.mrvac@grf.hr

Work institution: University of Zagreb, Faculty of Graphic Arts

Short CV:

Professor Nikola Mrvac, PhD was born on 28 May 1969. in Desni Srediček. He completed hie elementary education in Lasinj and graduated from the the Vocational school of graphic arts in Zagreb. In 1994 he graduated from the Faculty of Graphic Arts University of Zagreb, Department of Printing. In 2001 he completed his Master's Degree, entitled ''Typography development in multimedia society'', at the Faculty of Organization and Informatics in Varaždin. He completed his doctoral thesis, entitled ''Synthesis of interactions of selected graphic reproduction parameters“ in 2003 at the Faculty of Graphic Arts at the University of Zagreb and consequently was awarded a PhD degree in the field of graphic technology. After his studies he worked as a graphic arts teacher at the Graphics School in Zagreb in 1994, but in the same year he started working at the Faculty of Graphic Arts in Zagreb, Department of Printing, where he has been a full-time professor ever since. As a research associate and project manager he has been appointed to the following projects, which are an integral part of the National Science Research Programme of the Ministry of science and technology: 1999.- 2002. Influence of printing techniques and graphic materials on paper reycling efficiency”, 2002. -2006. "Specification of paper features and formulations for digital printing and its recycling“ 2007. - "A study of technological factors in graphic design for systematic quality improvement“ as an associate in 2007. - „Evaluation of quantitative and qualitative graphic reproduction process criteria“ as project manager. In 2012, he was appointed research fellow and in 2013 a full-time professor. The quality of his teaching is best demonstrated by his numerous memberships and engagement in faculty teaching boards and associations. (Committee for e-learning strategies, University of Zagreb, Committee for e-learning, Committee for learning and graduate exams at the University of Zagreb). He won the annual award of The society of university teachers, scholars and other scientists for the 2000/2001 academic year in the field of graphic technology, engineering sciences. He contributed greatly to creation of a new study programme which was consistent with Bologna regulations. The study programme of Graphic technology university study at the Faculty of Graphic Arts in Zagreb was based on the programme draft proposition written by Nikola. Furthermore, he is one of the co-authors of vocational study programme ''Multimedia, design and application'' of Vocational studies in Varaždin. The same programme was accepted by the Faculty of Graphic Arts in Kiseljak, University of Travnik. He cooperated with both institutions for the

purposes of higher educational system improvement and study programme adjustment to the up-to-date programme propositions. On the national level, he has been a member of National Council for Curriculum and Assesment and Technology and Informatics Working group. He is included in major decisions on study programmes as well as document drafting for the purposes of successful programme delivery. He is the chair of Vocational Education Council and the author of methodology of EVALUS system and EVA software (skill management and evaluation systems). Furthermore, his work activities have been actively promoting work and education in graphics. Until now he has published around 80 research papers (chapters, science journals, collection of papers, and so on).

Date of last academic appointment to the teaching and research position: 12. February 2013

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Vusić, Damir; Mrvac, Nikola; Milković, Marin; The neon colour spreading effect in various surround ambient conditions. // Tehnički vjesnik : znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. 18 (2011) , 2(2011); 219-225
2. Milković, Marin; Mrvac, Nikola; Vusić, Damir; Evaluation of the chromatic adaptation effect intensity by "tuning" the desaturated achromatic reproductions printed in the offset. // Tehnički vjesnik. 18 (2011) , 4; 519-528
3. Vusić, Damir; Milković, Marin; Mrvac, Nikola; The Influence of the Primary Color Stimuli Selection on the Neon Color Spreading. // TTEM - Technics Technologies Education Management. 7 (2012) , 1; 81-87
4. Tomiša, Mario; Mrvac, Nikola; Milković, Marin; Determination of Graphic Design Qualitative Criteria. // TTEM - Technics Technologies Education Management. 7 (2012.) , 1; 49-56
5. Milković, Marin; Mrvac, Nikola; Zjakić, Igor; Comparative Analysis of the Intensity of the Induction and Assimilation Effects of the Equivalent Geometric Structures of Graphic Reproductions. // TTEM - Technics Technologies Education Management. Volume 7 (2012) , Nuber 2; 49-56
6. Milković Marin; Matijević Mile; Mrvac Nikola, Intensity evaluation of the spreading and simultaneous contrast effects based on the dotted White's samples. // Tehnički vjesnik : znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. 19 (2012) , 3; 521-529
7. Milković, Marin; Mrvac, Nikola; Matijević, Mile, Evaluation of the effect of retinal localized chromatic adaptation intensity on desaturated achromatic reproductions derived by standard rendering methods. // Color research and application. 38 (2013) , 4; 277-283
8. Matijević, Mile; Mrvac, Nikola; Mikota, Miroslav, The Effect of Expansion and Simultaneous Contrast in Modificated Figural Dotted and Groundal Dotted Illusions. // Tehnički vjesnik: znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. 21 (2014) , 6; 1297-1301
9. Čerepinko, Darijo; Mrvac, Nikola; Milković, Marin, Determination of Visual Interest Points of Graphical User Interfaces for Tablet Newspapers Application. // Tehnički vjesnik : znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. 22 (2015) , 3; 659-665

10. Budimir, Ivan; Mrvac, Nikola; Matijević, Mile, The influence of the thickness of the grid in Munker-White effect. // Tehnički vjesnik. 22 (2015) , 2; 425-430

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

National scientific and research program of the Ministry of Science, Education and Sports
Project manager
2007 – 2013 „Evaluacija kvantitativnih i kvalitativnih kriterija procesa grafičke reprodukcije“, Code: 128-1281955-1960

Researcher:
2007 - 2013 "Studij tehnoloških čimbenika grafičkog dizajna za sustavno unapređenje kvalitete" Code:128-1281955-1962, key researcher: full professor Stanislav Bolanča

University of Zagreb – research support program for arts and sciences 2015 – project manager
“Standardizacija grafičkih prikaza u multimedijskom okruženju”

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 6

Course

Name of Course: **GRAPHIC DESIGN OF MEDIA CAMPAIGNS**

Code: **PDS 312**

Semester: II. Semester - Graphic Design

Teacher: Miroslav Mikota, assistant professor

Course Summary

Ethological aspects of graphic design, media campaigns, behaviour, acting and survival of media campaigns. Graphic design and symbolic systems of total media activities. Media campaigns and the menacing „graphic design“ in the world of chaos and life. Graphic design and media dialectics of words and power. Graphic communication as a struggle for media dominance. Graphic design and dominant communication in media. Media campaigns and graphic design as the symbols of contemporary advertising activities. Theoretical origins of media marketing. Graphic design from the integral media marketing perspective. Graphic design and continuous political competition in the media. Media image and market graphic design. Media identity (profile, professionalism, individuality, uniqueness, reputation, recognition, honour, good name, respect) and the illusion of graphic design in media campaigns. Graphic designer – new media vocation, profession or media marketing. Graphic design and media actiona and campaigns. Fear in media and the fight for survival of media campaigns. Graphic design and the «think-tank» media form of campaigns at all levels of media communication: books, film, newspapers, news agencies, radio, television, new media, the internet.

Outcomes and competencies aligned with the level 8.2 of the CroQF:

- advanced knowledge in the field of graphic design media campaigns
- specialized skills and techniques necessary for critical problem solving by means of innovative approaches
- independence, scientific and professional integrity

Description of teaching methods:

Tutorial

Compulsory literature:

1. W.Bauer & I.Dumotz & S.Golowin, Lexikon der Symbole, Marx Verlag, Wiesbaden, 2006.
2. A. Gregory, Planiranje i upravljanje kampanjama, Hrvatska udruga za odnose s javnošću, Zagreb, 2006.
3. M.Klaman, Lobiranje / Le lobbing et ses secretes, Clio, Beograd/Paris, 2004.
4. B.McNair, Uvod u političku komunikaciju / An Introduction to Political Communication, Udžbenik Sveučilišta u Zagrebu, Fakultet političkih znanosti, Zagreb, 2003.
5. M. Plenković, Suvremena RTV retorika (reprint), HKD & Nonacom, Zagreb, 2004.
6. L.R. Potter, Komunikacijski plan: Srž strateških komunikacija /The Communication Plan: The Haeart of Strategic Communication, prijevod Hrvoja Heffer, Hrvatska udruga za odnose s javnošću, Zagreb, 2007.

Additional literature:

1. 18. medunarodna konferencija tiskarstva, dizajna i grafičkih komunikacija Blaž Baromić - zbornik radova / Mikota, Miroslav (ur.). Zagreb : HDG, 2014 (zbornik) – odabrani radovi
2. 17. medunarodna konferencija tiskarstva, dizajna i grafičkih komunikacija Blaž Baromić - zbornik radova / Mikota, Miroslav (ur.). Zagreb : HDG, 2013 (zbornik) – odabrani radovi
3. 16. medunarodna konferencija tiskarstva, dizajna i grafičkih komunikacija Blaž Baromić - zbornik radova / Mikota, Miroslav (ur.). Zagreb : HDG, 2012 (zbornik) – odabrani radovi

Number of lectures: 30

ECTS: 7

Teaching quality control:

Final seminar paper and oral exam

Methods of teaching evaluation:

Evaluation of curriculum and teaching performance is conducted by means of anonymous student surveys.

Teacher

Name and Surname Miroslav Mikota, assistant professor

E-mail: mmikota@grf.hr

Work institution: University of Zagreb Faculty of Graphic Arts

Short CV:

Miroslav Mikota was born on March 4, 1967 in Zagreb where he finished primary school, high school and the Faculty of Graphic Arts, University of Zagreb, where he graduated in 1990, received MSc title in 2005 and PhD title in 2007. He is employed on University of Zagreb, Faculty of Graphic Arts since 1990 now as the assistant professor at the Department of Graphic Design and Image Information. He was the founder and the head of the Department of Applied and Art Photography. In 2011 he was elected in scientific title of scientific fellow, in 2013 in the nominal title of college professor and in 2015 in the academic title of assistant professor. Miroslav Mikota is the author of more than 90 scientific and technical papers, more than 400 lexical articles and a number of reviews and comments of photographic exhibitions. As editor, reviewer or author he collaborated with a number of professional and scientific journals. He is the editor of profession Printing and Photography on the projects of Lexicographic Institute (Croatian Encyclopaedia, Lexicon of Fine Arts and Technical Lexicon). Miroslav Mikota participated in a number of professional and scientific conferences. He is the head of the organization of the International Conference on Printing, Design and Graphic Communications Blaž Baromić and the member of the Scientific Committee of the International Scientific Conference Printing & Design, International Scientific Conference MATRIB, International Conference on Printing, Design and Graphic Communications Blaž Baromić, International Conference on Management of Technological Changes and International Seminar on Quality Management in Higher Education. He is the editor of scientific books and books of abstracts and proceedings of scientific conferences and scientific journal Acta Graphica. He published the book Creation by Photograph and two scripts. Miroslav Mikota is the author and performer of the course programs of undergraduate and graduate

studies, performer of a PhD course and the reviewer of one university undergraduate study program. He participated in the organization and management of photographic courses, seminars and workshops, and he is a member and president of a large number of professional jury and the professional associations. He has published over 1000 photographs and illustrated the front pages, books, catalogs, calendars, newspapers, magazines, postcards, posters and web pages and he is the author of 30 exhibitions. In the public he is best known as the author of portraits of Croatian writers and personalities from cultural life and HDR winter landscapes.

Date of last academic appointment to the teaching and research position: 2. November 2015

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

1. Budimir, I; Mikota, M; Budimir, I. THE AESTHETIC VALUE OF THE GOLDEN RATIO AND RHYTHM OF THE PHOTOGRAPHS. // Acta graphica. 26 (2015) , 1-2; 46-52
2. Mikota, M; Ivana, P; Matijević, M., UTJECAJ PROMJENE RGB KANALA DIGITALNOG ZAPISA FOTOGRAFIJE UZ ZADRŽAVANJE IKONIČNOSTI NA PERCEPCIJU MODNE FOTOGRAFIJE. // Tekstil, časopis za tekstilnu tehnologiju i konfekciju, 64 (2015), 1-2; 13-19
3. Matijević, M; Mrvac, N; Mikota, M., THE EFFECT OF EXPANSION AND SIMULTANEOUS CONTRAST IN MODIFICATED FIGURAL DOTTED AND GROUNDAL DOTTED ILLUSIONS. // Tehnički vjesnik: znanstveno-stručni časopis tehničkih fakulteta Sveučilišta u Osijeku. 21 (2014) , 6; 1297-1301
4. Mikota, M.; M. Matijević; Pavlović, I. , REALIZACIJA HDR FOTOGRAFIJE Hi Fi DOD BUBBLE JET ISPISOM NA OPTIMALNOJ PODLOZI ZA ISPIS. // Tehnički Glasnik 7 (2013) ,3; 252-257
5. Rastočić, M.; Mikota, M; Pavlović, I., PREPOZNATLJIVOST MODNE FOTOGRAFIJE OBJAVLJENE NA DRUŠTVENIM MREŽAMA // Proceedings 18th International Conference on Printing, Design and Graphic Communications Blaž Baromić 2014, Zagreb: Hrvatsko društvo grafičara, 2014. 306 – 317
6. Žeželj, T; Mikota, M.; Matijević, M., REPRODUKCIJA PRIMARNIH BOJA ADITIVNE I SUPTRAKTIVNE SINTEZE U WEBP FORMATU // Zbornik radova Blaž Baromić 2014 / Mikota, Miroslav (ur.). Zagreb : Hrvatsko društvo grafičara, 2014. 274-285
7. Mikota, M.; Pavlović, I; Tomiša, M; Matijević, M., UTJECAJ IZBORA DOD Hi Fi BUBBLE JET PODLOGE ZA ISPIS NA STANDARDNE BOJE REALNIH FOTOGRAFSKIH MOTIVA. // Zbornik radova MATRIB 2013, Zagreb, HDMT, 2012. 261–269
8. Pavlović, I; Mikota, M., FORMIRANJE MODERNE FOTOGRAFIJE. // Proceedings 16th International Conference on Printing, Design and Graphic Communications Blaž Baromić 2012, Zagreb, HDG, 2012. 88–98

List of scientific and art projects assigned to in the last 5 year and which are relevant to the doctoral programme

National scientific and research program of the Ministry of Science, Education and Sports; researcher

1. 2007 – 2013 „Evaluacija kvantitativnih i kvalitativnih kriterija procesa grafičke reprodukcije", (128-1281955-1960), key researcher: N. Mrvac

2. 2007–2014 “Nove formulacije materijala, karakteristike otisaka i čimbenici okoliša” (128–1281955–1953), key researcher: Z. Bolanča

Number of successful supervision undertakings which resulted in completion of doctoral thesis: 0