





BASIC STUDIES

BELGRADE, MMXII



| TEMPUS project coordinator | Ana Savić, PhD |
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| Publishing Director | Dragoljub Martinović, PhD |
| Editorial Board | Dragoljub Martinović, PhD Jadranka Ajčević, MSc |
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THE STUDY PROGRAM AUDIO AND VIDEO TECHNOLOGIES

BASIC STUDIES





| Preface 1 |
|-----------------|
| General 2 |
| Study program3 |
| Infrastructure9 |
| Curricula14 |
| Curriculum17 |
| Syllabus |



School of Electrical Engineering and Computer Science Applied Studies in Belgrade (VIŠER), including its study program Audio and video technologies, became a carrier for the TEMPUS project no. 517022-TEMPUS-1-2011-1-RS-TEMPUS-JPCR, under the title Innovation and Implementation of the Curriculum Vocational Studies in the Field of Digital Television and Multimedia. The school is carrier of the project and coordinates fulfillment of the complete project together with 12 included partners from the South Eastern Europe region and European Union.



This publication is aiming to present new innovated study program of Audio and video technologies. This program, part of TEMPUS project, contains courses for teaching digital television and multimedia fields.

The main features of VIŠER are following: It is a public, higher education institution, financing from the budget of the Republic of Serbia and the income from tuition fees. The main activity is tree year vocational and one year specialized professional education in the fields of electrical engineering, information technology and communications. Graduate students receive bachelor and master professional diplomas. The school has seven programs of basic studies, four programs of specialized professional studies, and one distance-learning program. More than hundred teachers work in VIŠER. Thanks to its human and infrastructure resources VIŠER is the local in leader ICT educational field and tends to become the leader in a broader region.



There is a need for professional staff training, for improving knowledge and occupations necessary in the dynamic development of technique and technology in the field of sound, pictures and media, with a constant modification to the changes. Study program Audio and video technologies at School of Electrical Engineering and Computer Science is a unique study program of the vocational studies with the above mention orientation existing in the region.

Education of students enrolled in the Audio and video technologies study program should satisfy needs arising from general development in this field on the manpower market.

The target of the study program Audio and video technologies is completely in accordance to the undertaking and objectives of the higher education institution where the program is being provided; therefore it is consistent with the application of European and global standards aiming to organizing high quality studies. Study program Audio and video technologies forms skilled electrical and IT engineers for audio and video technologies, which will be able to be topped up from technologies used in the field of sound and pictures, in other words training practical work in the field and further skilled training. After graduation from the study program Audio and video technologies, wide spectra of vacations is offered, "all television related", Internet and studio operations and similar.

During the last five years the program has been improved and adjusted to the development in mentioned fields and remained in line with the Bologna declaration corresponding to the higher education requests.

In accordance with Higher Education legislative of the Republic of Serbia School of Electrical Enigneering and Computer Science gained official accreditation in 2012 for new and inovated study program Audio and video technologies.



Purpose of the study program

Audio and video technologies study programs have clearly defined the following purposes:

- education of students for recognizable and defined professions related to the production in the field of sound and picture;
- providing competencies for working on the tasks of production and post production of the sound and picture;
- availability of skills and knowledge in at least three related professions (audio and video technology, IT, arts, management) and tendencies towards team work.

Education of creative multimedia engineers comprehends constant follow up of techniques development as well as dynamic market development meaning multimedia industry.

Objectives of the study program

Objective of the audio and video technology study programs completely compliant to the mission and objectives of the School of Electrical Engineering and Computer Science therefore is it coherent in application of European standards in order to organize high quality studies.



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Objectives of the study program, to:

- translate knowledge and skills in the field of audio and video technique;
- integrate basic technical, IT and artistic knowledge in accordance to the needs of manufacturing, educational and service vocations in the field of audio and video techniques;
- qualify for the works in the public and private sector
- qualify for the team work and work in the multicultural environment;
- qualify for further training in the field.



Vocational electrical and IT engineer for audio and video technologies should be trained to apply and follow top-up tasks related to the production and post production of sound and picture, design and usage of audio and video system.

Structure of the study program

Title of study program: Audio and video technologies.

Type of the study: Vocational studies lasting three years (six semesters – 180 ECTS).

Professional title: Vocational electrical and IT engineer.

Conditions for enrolment: Completed high school and passed entry exam.

Courses :

- 2 mandatory
- 32 optional
- Professional Practice + Final Project

Method of performing the studies

Study program is compliant to the Bologna declaration and the Law on Higher Education. Tuition is performed though lectures, practice and preparation of the final project. All courses last one semester. All courses are equal by its scope (75 hours per semester) hours and each course gain 6 ECTS. Professional Practice gains 4 ECTS, and Final Project 8 ECTS. All courses have defined pre-conditions. Through mandatory courses student gains basic knowledge related to the mathematics and electrical engineering, and by further selection of the courses tends to video technique, audio technique, graphics and animation, whereas multimedia approach is not excluded. School provides tuition base: schoolrooms and rooms for auditory tuition, dedicated laboratories for the study program (audio studio,



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TV studio, studio for animation and picture editing, and multimedia laboratories), as well as PC laboratories linked to broadband and the library.

Audio and video tehnology study programe is integral, integrated and interdisciplinary (technical-tehcnological sciences and arts), compliant to the contemporary scientific achievements, totally adjusted to the Bologna declaration' principles.

> Competency of the graduated engineers of study program Audio and Video Technologies

Student gains general and course related specific capabilities by mastering audio and video technologies study program to:

- follow up and apply innovations in the field of expertise by gaining knowledge in the field of production and postproduction of the sound and picture, as well as in the field of applying technologies in 2D and 3D computes animation;
- develop skills and capabilities in usage of the knowledge by qualifying for projecting, as well as design of audio and video system;
- use informational-communicational technology in mastering knowledge in applicable field (usage of knowledge in processing audio and video signal and principles of digital systems in projecting, usage and maintenance of media and telecommunication systems, knowing how to use computes technology and devices, with general and applicable software, normative, regulations and standards in working with audio and video signals, as well as in the field of computer animation);
- to design and organize working processes, organize production controls of the audio and video devices, as well as media material (audio and video inscriptions), contribute to operative decisions on the scope adjustability for implementation and follow up of the operations related to the media technical support;
- have a capability to compose and present working results (audio and video inscription, multimedia presentation);
- importance and strategy of environment, as well mandatory

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inclusion of environmental protection in facility construction, above all working on designing noise protection in business and residential facilities and noise monitoring in working and living environment.



Audio and video technology studies graduates should cover wide spectra of vocations on the tasks related to the television, radio, Internet, animation, studio works and similar. Some of the tasks to be performed by audio and video study program vocational electrical and IT engineers are:

- audio professions: radio and TV sound engineer, movie sound engineer, theatre and conference halls sound engineer, sound engineer in multimedia projects, acoustics designer for reproduction of speech and music, designer for noise protection in business and residential facilities, executor in monitoring and noise measurement for environmental protection;
- video professions: technical leadership, cameraman, electronic editor, graphic effects designer, picture designer – camera controls, cameraman, audio and video technique assistant, multimedia networks assistant;
- graphics and animation: graphic designer, animator, computer animator, video graph, multimedia designer, web designer.







INFRASTRUCTURE

Audio and video vocational studies program possess space and equipment for performing educational process: amphitheaters and classrooms; general dedicated laboratories with contemporary working surrounding, program tools; specialized laboratories.

Specialized laboratories of the Audio and video technologies study program are:

- Multimedia HDTV studio;
- TV studio complex;



- Audio studio complex;
- Studio for animation and sound editing;
- Multimedia laboratory.

Equipment and functions of the above mentioned studios form a unique unit that provides performance in the field of multimedia. In order to provide an educational and laboratory base, the School started establishing a dedicated multimedia HD television studio, which is in completion phase.

A/t INFRASTRUCTURE

Multimedia digital HD television studio will be completed using existing equipment and new equipment from funds of TEMPUS project. Equipment will be in digital HD format 16:9, resolution 1920x1080 and DV format 16:9/4:3, resolution 720x576. Multimedia HD television studio will be multifunctional and flexible.

After finalization of the above mentioned television studio, the study program will have the most contemporary multimedia digital television studio where lectures for all courses in the field of digital video and audio techniques, since it is of special importance for courses related to the television techniques, television production and post production.

TV studio complex (Recording studio, TV control room, analogue and digital video editing room)

Studio for television recording is equipped with professional TV cameras and lighting. Studio is connected to TV control room. TV studio provides recording of informative type of programs, and small talk show, from here TV signal can be forward to TV control room. TV control room enables full signal control, picture adjustments, synthesis of audio and video signals with computer graphics for complete TV picture. TV studio has HD camcorders, BETA SP and SVHS cameras, digital video mixer and monitoring system. Video editing room provides linear and non-linear editing of recorded footage. Video servers (with FinalCut Server and ToolsOnAir software) and videocassette recorders provide different possibilities for recording of video footage.

Audio studio complex (5.1 control room – digital audio editing, sound recording studio, analogue control room – analogue audio editing)

5.1 control room is exclusive facility, which by its appearance, equipment and functionality represents step forward in similar facilities. It has 5.1 monitoring system Dynaudio Air 15, Digidesign ProTools HD3 system with 3 interfaces in Apple Mac Pro computer, AVID HD I/O 16 channel audio interface and Digidesign C24 console. Recording studio is well equipped with the microphones



INFRASTRUCTURE

set of highest rank. Analogue control room is designed for training students in "classical" analogue audio systems. All these rooms are interconnected with installations into one functional unit, which makes great flexibility and functionality in everyday use.





Studio for animation and picture editing

Studio for classical animation has a number of lighting tables. Studio for computer animation is equipped with new computers and appropriate corresponding software for 2D and 3D animation.

Multimedia laboratory

Multimedia laboratory of studies program Audio and video technologies and Multimedia Technologies and Digital Television was designed with 20 workstations for students, and 1 workstation for lecturer. Every workstation consists of Apple iMac computer, headset, MIDI keyboard, M-Box interface. Laboratory has HD projection and it is acoustically treated, adequately lightened and secured with CCTV.





INFRASTRUCTURE



CURRICULA

Audio and video study program is based on the contemporary knowledge and achievements of theory and practice in the fileds of audio, video and media, it is formed in compliance with related study programs organizing on the Bachelor level, worldwide.

Basic preferences of the program are:

- Basic vocational studies lasting for 3 years;
- There are 2 mandatory and 32 optional courses (26 to be selected).

Curricula contain 34 courses distributed per school years in following manner:

| Year | Courses | | | |
|-----------------|--|-----------------------------------|--|--|
| 1 st | 12 courses | 2 mandatory + 10 optional courses | | |
| 1. | 8 to be selected | | | |
| Dnd | 12 courses all optional | | | |
| 2.13 | 10 to be selected | | | |
| | 10 courses | all optional | | |
| 3 rd | 8 to be selected | | | |
| | Professional Practice and Final project are mandatory. | | | |

Following groups of courses are represented in the study program structure:

- General education courses: Mathematics in Engineering, Electrical Engineering, Fundamentals of IT, Mass media, English Language, Electronics, Application Software, Fundamentals of Management, Marketing, Social Networks, Multimedia Production;
- Audio courses: Electroacoustics, Audio Electronics, Recording Studios Equipment, MIDI and Sound Synthesis, Musical Instruments, Room Acoustics, Sound Recording, Sound System Engineering, Sound Design, Music Production;
- Video and Television courses: Fundamentals of TV, TV Systems





and Video Technologies; Electrical Lighting Design, Image Recording, TV cameras, Digital TV, Video Production, Studio and Field TV Production;

 Computer graphic and animation courses: Computer Graphics, Digital Multimedia 1, Animation Basics, Computer Animation 1, Digital Design of Publications.



Audio and video technology curricula is established so that students gain basic knowledge in the field of mathematics and electircla engineering though mandatory courses, and with furhter selection of courses the student will be orientated to one specific field:

- audio technique;
- video technique;
- animation and graphics;

multimedia approach is not excluded.

Educational process is being implemented through lectures, practice and individual or team work on adequate projects. Exams are taken through colloquiums, seminar essays. Educational process comprehends design of individual or team works and projects under

CURRICULA

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supervision of skilled tutors and mentors, respecting especially individual capabilities and interest of the students.

Suggested curricula of Audio and video technologies study program is being innovated in accordance to the previously accredited Audio and video technologies study program (2007) in compliance to the development of the above mentioned fields in the last five years:

- Newly implemented courses (9%);
- Innovated courses (91%).

Courses have been innovated mostly comparing to the content of lectures and practise. Laboratory experiments have been alternated according to the software development and on the basis of the present market needs. Changes in the literature are related to the application of the most contemporary foreign literature, as well s new applications (workbooks, manuals and similar) published by subjected lecturers and assistants. At the same time, contemporary methods are applied so that students can adopt and master teaching materials in the highest level, enabling students to maximally used possibility of passing the exams thorough pre-exams duties.





CURRICULUM

| No. | Course | Y | S | Lt | Р | Lb | ECTS |
|-----|-----------------------------------|---|---|----|---|----|------|
| 1. | Mathematics in Engineering | 1 | 1 | 2 | 3 | 0 | 6 |
| 2. | Electrical Engineering | 1 | 1 | 2 | 3 | 0 | 6 |
| 3. | Fundamentals of IT | 1 | 1 | 2 | 3 | 0 | 6 |
| 4. | Electroacoustics | 1 | 1 | 2 | 3 | 0 | 6 |
| 5. | Mass Media | 1 | 1 | 2 | 3 | 0 | 6 |
| 6. | Digital Multimedia 1 | 1 | 1 | 2 | 3 | 0 | 6 |
| 7. | Electronics | 1 | 2 | 2 | 3 | 0 | 6 |
| 8. | Fundamentals of TV | 1 | 2 | 2 | 3 | 0 | 6 |
| 9. | Computer Graphics | 1 | 2 | 2 | 3 | 0 | 6 |
| 10. | Audio Electronics | 1 | 2 | 2 | 3 | 0 | 6 |
| 11. | English Language | 1 | 2 | 2 | 3 | 0 | 6 |
| 12. | Application Software | 1 | 2 | 2 | 3 | 0 | 6 |
| 13. | TV Systems and Video Technologies | 2 | 3 | 2 | 2 | 1 | 6 |
| 14. | Recording Studios Equipment | 2 | 3 | 2 | 2 | 1 | 6 |
| 15. | Image Recording | 2 | 3 | 2 | 2 | 1 | 6 |
| 16. | MIDI and Sound Synthesis | 2 | 3 | 2 | 2 | 1 | 6 |
| 17. | Fundamentals of Management | 2 | 3 | 2 | 3 | 0 | 6 |
| 18. | Electrical Lighting Design | 2 | 3 | 3 | 0 | 2 | 6 |
| 19. | Musical Instruments | 2 | 4 | 2 | 3 | 0 | 6 |
| 20. | Room Acoustics | 2 | 4 | 2 | 2 | 1 | 6 |
| 21. | TV Cameras | 2 | 4 | 2 | 2 | 1 | 6 |
| 22. | Digital TV | 2 | 4 | 2 | 2 | 1 | 6 |
| 23. | Sound Recording | 2 | 4 | 2 | 2 | 1 | 6 |
| 24. | Animation Basics | 2 | 4 | 2 | 2 | 1 | 6 |
| 25. | Computer Animation 1 | 3 | 5 | 3 | 0 | 2 | 6 |
| 26. | Video Production | 3 | 5 | 3 | 0 | 2 | 6 |
| 27. | Sound System Engineering | 3 | 5 | 3 | 0 | 2 | 6 |
| 28. | Studio and Field TV Production | 3 | 5 | 3 | 0 | 2 | 6 |
| 29. | Marketing | 3 | 5 | 2 | 3 | 0 | 6 |
| 30. | Sound Design | 3 | 6 | 3 | 0 | 2 | 6 |
| 31. | Music Production | 3 | 6 | 3 | 0 | 2 | 6 |
| 32. | Multimedia Production | 3 | 6 | 3 | 0 | 2 | 6 |
| 33 | Social Networks | 3 | 6 | 3 | 0 | 2 | 6 |
| 34. | Digital Design of Publications | 3 | 6 | 3 | 0 | 2 | 6 |
| 35. | Professional Practice | 3 | 6 | | | | 4 |
| 36. | Final Project | 3 | 6 | | | | 8 |

Y-Year, S - Semester, Lt - Lectures, P - Practice, Lb - Laboratory work, ECTS - European Credit Transfer System

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Mathematics in Engineering

Instructor(s): Professor Ana Savic, PhD

Course Status: Compulsory

Number of ECTS: 6

Prerequisites: none

Course Objectives: Master matrix, systems of equations, statements, functions, and integrals to allow monitoring of professional electrical engineering subjects and extending the mathematical knowledge.

Course Outcomes: Students will be able to solve complex mathematical tasks related to the application of modern mathematical methods in the Electrical Engineering field.

Course Content:

Theoretical instruction:

- 1. The concept of matrix, characteristics and operations.
- 2. The concept of determinants and characteristics. Methods for calculation.
- 3. Inverse matrix.
- 4. Solving systems of linear equations.
- 5. A number of series, basic characteristics and limits.
- 6. Functions: basic properties and limits.
- 7. Derivative of functions.
- 8. Differential of functions.
- 9. Differential equations.
- 10. Examination of functions characteristics and drawing graphics.
- 11. Indefinite integrals.
- 12. Definite integrals.
- 13. Calculating arc length using integration.
- 14. Calculating volumes and areas using integration.
- Practical instruction (Problem solving sessions/Lab work/Practical training):

Practical classes follow a teaching program and go through the exercises in computer laboratory using software packages Octave and Maxima.

- 1. A. Savic, Z. Miskovic, A. Zekovic, Matematika 1-udzbenik, Visoka skola elektrotehnike i racunarstva, Beograd, 2011.
- A. Savic, A. Zekovic, Matematika 1-prirucnik za laboratorijske vezbe, Visoka skola elektrotehnike i racunarstva, Beograd, 2011.
- I. Kovacevic, Z. Miskovic, A. Savic, Matematika za inzenjere, Visoka skola elektrotehnike i racunarstva, Beograd, 2008.
- Z. Miskovic, I. Kovacevic, A. Savic, Zbirka resenih zadataka iz matematike sa pismenih ispita, Visoka skola elektrotehnike i racunarstva, Beograd, 2007.
- I. Kovacevic, A. Savic, Matematika-prirucnik za laboratorijske vezbe, Visoka skola elektrotehnike i racunarstva, Beograd, 2008.

| Number of active les | Other classes: | | | | | |
|---|----------------|------------------|-----------------|--------|--|--|
| Lectures: 30 | Exercises: 30 | Other: 15 | Research study: | | | |
| Instruction methods: Lectures, calculation exercises, laboratory exercises, consultations, term papers, defense laboratory exercises and written exam, oral exam. | | | | | | |
| Grading (maximum number of points: 100) | | | | | | |
| Preliminary activitie | s Points | | Final Fram | Points | | |

| , | | | | | |
|------------------------|--------|--------------|--------|--|--|
| Preliminary activities | Points | Final Exam | Points | | |
| Lectures activities | 10 | Written exam | 0 | | |
| Practical work | 10 | Oral exam | 29 | | |
| Colloquium(s) | 51 | | | | |
| Seminar(s) | 0 | | | | |

Study Program: AVT, ASUV, ELITE, EPO, NET, NRT, RT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Electrical Engineering

Instructor(s): Sonja N. Krstić PhD, Jadranka M. Ajčević

Course Status: Compulsory, Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Acquisition of basic knowledge in electrotechnics field

Course Outcomes: Knowledge of operation and characteristics of generators, resistors, coils and capacitors in the networks with a time constant and periodic currents

Course Content:

Theoretical instruction:

- 1. Electrostatics: Coulomb's law, electric field vector, the electric potential.
- 2. Electrostatics: Potential difference and voltage, capacitors and capacitance.
- Electrical networks with a time constant currents: Electric current, electric circuits, resistance, resistors and conductors.
- Electrical networks with a time constant currents: Electrical work and power, sources of electric current; Kirchhoff's laws.
- Electrical networks with a time constant currents: Solving electrical networks; electrical networks theorems: superposition theorem
- 6. Electrical networks with a time constant currents: Thévenin's theorem
- 7. Electromagnetism: Magnetic field, magnetic field of current contours in the vacuum
- 8. Electromagnetism: Magnetic properties of materials, electromagnetic induction
- 9. Electromagnetism: Inductive elements and inductance
- Electrical networks with periodic currents: Electrical network with periodic currents, R (resistive) elements (serial and parallel connection of resistors)
- Electrical networks with periodic currents: L (inductive) and C (capacitive) elements (serial and parallel connection); power and power factor
- 12. Electrical networks with periodic currents: Basic notions during the change of the working regime in electrical networks
- 13. Electrical networks with periodic currents: Solving electrical networks.
- *Practical instruction (Problem solving sessions/Lab work/Practical training):*

1. Introduction to the software package ElectronicsWorkbench (EWB), The basic elements, the sources of power supply, indicators and instruments in EWB; 2. Ohm's law; 3. Kirchhoff's laws; 4. Thévenin's theorem; 5. Resistor in the circuit of alternating current (AC circuit); 6. Capacitor in AC circuit; 7. Electromagnetic coil in AC circuit; 8. Serial RLC circuit; 9. Parallel RLC circuit;

Textbooks and References:

 A. Đorđević, Osnovi Elektrotehnike 1. deo – Elektrostatika; Osnovi Elektrotehnike 2. deo – Stalne struje; Osnovi Elektrotehnike 3. deo – Elektromagnetizam; Osnovi Elektrotehnike 4. deo – Kola promenljivih struja, Akademska misao, Beograd, 2007

S. Krstić, I.Đukić, Zbirka zadataka iz elektrotehnike - Elektrostatika - Vremenski nepromenljive električne struje; Zbirka zadataka iz elektrotehnike - Elektromagnetizam - vremenski promenljive električne struje, VETŠ, Beograd,

| Number of active lessons: 75 | | | | Other classes: |
|------------------------------|---------------|------------------|-----------------------|----------------|
| Lectures: 30 | Exercises: 30 | Other: 15 | Research study: | |
| Instruction method | s: | | | |
| | Grad | ing (maximum ni | umber of points: 100) | |
| Preliminary activiti | es Points | | Final Exam | Points |
| Lectures activities | | | Written exam | |
| Practical work | | | Oral exam | |
| Colloquium(s) | | | | |
| Seminar(s) | | | | |

Study Program: AVT, NRT

| Туре | and Level of Studies: Basic applied studies, First level of higher education |
|--|---|
| Cour | se Title: Fundamentals of IT |
| Instr | r uctor(s): Ph.D Slobodanka S. Djenic |
| Cour | se Status: Optional |
| Num | iber of ECTS: 6 |
| Prere | equisites: none |
| Cour cessir | se Objectives: The lectures should make the students able to develope and use modern systems (for: collecting, p ng and transporting informations) using actual programming tools. |
| Cour | se Outcomes: Students are able to understand development and use of actual information technologies. |
| Cour. Theor 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. | se Content: retical instruction: Introductory lecture IT Fundamentals Computing Systems Informations and Hardware Informations and Software Informations and Operating Systems Information Systems Computer Networking and Informations Security Communications and Learning via the Internet Course summary and self-evaluation |
| Practa 1. 2. 3. 4. 5. 6. 7. 8. 9. 10. Textl 1. | ical instruction (Problem solving sessions/Lab work/Practical training): Learning Management Systems Operating Systems Command-line Interfaces Linux Office Tools Windows Office Tools Database Tools Cryptography Tools Internet based Tools Communications and Learning via the Internet Websites: Wikis and Bloogs books and References: J. Senn, Information Technology: Principles, Practices, and Opportunities, Prentice Hall, 2004. |
| 2. 3. | S. Obradovic, Racunari – arhitektura, hardver, sistemski softver, VISER, Beograd, 2010. S. Djenic, A. Miletic, M. Radivojevic, M. Karadzic, Informacione tehnologije, elektronski prirucnik, VISER, Beograd, 2011. |

| Number of active lessons: 75 | | | | Other classes: | | | |
|--|---|----------------|---------------------|----------------|--|--|--|
| Lectures: 30 Exercises: 45 | | Other: | Research study: | | | | |
| Instruction method | Instruction methods: Lectures, laboratory exercises, consultations, colloquium, final exam. | | | | | | |
| | Gradin | g (maximum num | ber of points: 100) | | | | |
| Preliminary activities Points Final Exam | | | Points | | | | |
| Lectures activities | | W | ritten exam | | | | |
| Practical work 10 Oral exam | | | | | | | |
| Colloquium(s) | 30 | Pr | ractical exam | 30 | | | |
| Seminar(s) | 30 | | | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Electroacoustic

Instructor(s): Professor Radmila Vukić, PhD

Course Status: Compulsory

Number of ECTS: 6

Prerequisites: none

Course Objectives: Students master basics of acoustic and electroacoustic transducers.

Course Outcomes: Students will be trained to independently solve the basic problems of physical, room and physiological acoustics.

Course Content:

Theoretical instruction:

- 1. Introductory class. Basic terms of acoustics.
- 2. Basic terms of Physical Acoustics. Sound. Sound waves. Sound pressure. Wavelength. Frequencies.
- 3. The intensity of sound. Simple and complex sound. At the same time several radiation sources. Sound attenuation.
- 4. Diffraction. Refraction. Absorption coefficient.
- 5. Basic terms of physiological acoustics. Sense of hearing. Outer, middle and inner ear.
- A sense of sound intensity and height. The sound intensity and height and timbre. Audible area of the ear. Decibels, fons and sons.
- 7. Acoustic features of speech. Mechanism of speech. Vowels and consonants. Speech intelligibility.
- 8. Basic terms of room acoustics. Sound field. The absorption of the room. Reverberation time.
- 9. The intensity of sound in the room. Sound absorbers. The geometric shape of the room.
- 10. Analogy.
- 11. The basic terms of electroacoustic. Microphones.
- 12. Speakers. Speaker crossover.
- 13. Headphones.

Practical instruction (Problem solving sessions/Lab work/Practical training):

- 1. Measuring sensitivity of the ear.
- 2. Measurement of the threshold of audibility.
- 3. Examination of the distribution of sound pressure in the room.
- 4. Measurement of the reverberation time

Textbooks and References:

- 1. P. Pravica, D. Drinčić, Elektroakustika, VIŠER, 2008.
- 2. LJ. Stanimirović, Praktikum za laboratorijske vežbe iz Elektroakustike, VIŠER, 2007.

Number of active lessons: 75

| Number of active le | other classes. | | | |
|---------------------|----------------|------------------|-----------------|--|
| Lectures: 30 | Exercises: 30 | Other: 15 | Research study: | |

Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | |
|---|--------|--------------|--------|--|
| Preliminary activities | Points | Final Exam | Points | |
| Lectures activities | 10 | Written exam | 40 | |
| Practical work | 10 | Oral exam | | |
| Colloquium(s) | 40 | | | |
| Seminar(s) | | | | |

Study Program: AVT, RT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Mass Media

Instructor(s): Lelica J. Kostic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Is to introduce student to Mass media studies.

Course Outcomes: Gaining knowledge required for working, presenting and participating in Mass media.

Course Content:

Theoretical instruction:

- What are media? History, Theoretical guidelines, and interaction with media culture. Media Culture, Markets, Politics and Ideology.
- 2. Global media, mass communications and their influence in modern society. Hypermedia society.
- 3. Media and knowledge. "Educating knowledge". Basics of media education.
- Press. Sociological and psychological aspects of press and their influence on individual and collective (public) awareness.
- Television symbol of media power. History, technology and genres. Sociological and psychological aspects of
 press and their influence on individual and collective (public) awareness.
- Radio History, technology. Principles of communicating and interactions. Sociological and psychological aspects
 of press and their influence on individual and collective (public) awareness. Orientation towards adolescent population.
- Cinematography Industry of illusions. History, technology and genres. Aesthetics. Influence on individual and collective (public) awareness.
- Social networks Virtual communication. Educational context. Sociological and psychological aspects. Estrangement as a global phenomenon of Internet. Internet abuse as a clinical phenomenon. Use of media in everyday market. Advertising in new media.
- 9. Practical instructions for promoting and appearing in radio and television. Decision, preparation, Effects. Media Ethics. Media responsibility. Freedom and public responsibility.
- 10. The truth and freedom. Manipulation.

Practical instruction (Problem solving sessions/Lab work/Practical training): Accompanies the lectures.

Textbooks and References:

- 1. D. Kelner, Medijska kultura, Klio, Beograd 2004.
- 2. A. Brigs, T. Kolbi, Uvod u studije medija, Klio, Beograd, 2005.
- 3. R. Lorimer, Masovne komunikacije, Klio, Beograd, 1998.
- 4. E. Herman, Globalni mediji, Klio Beograd, 2001.

Number of active lessons: 75

| Number of active ressons. 75 | | | | vulei classes. | | | |
|------------------------------|---|--------|-----------------|----------------|--|--|--|
| Lectures: 30 | Exercises: 45 | Other: | Research study: | | | | |
| Instruction methods: | | | | | | | |
| | Grading (maximum number of points: 100) | | | | | | |
| Preliminary activiti | es Points | | Final Exam | Points | | | |
| Lectures activities | 10 | | Written exam | 30 | | | |
| Practical work | | | Oral exam | | | | |
| Colloquium(s) | 60 | | | | | | |
| Seminar(s) | | | | | | | |

Study Program: AVT, NCT, CT

Type and Level of Studies: Basic applied studies, First level of higher education.

Course Title: Digital Multymedia 1

Instructor(s): Dragoljub B. Martinović, PhD

Course Status: Electable

Number of ECTS: 6

Prerequisites: Knowing the basic concepts of digital signal representation and the use of computer

Course Objectives: Introduction to the principles of digital multimedia. Acquisition of practical knowledge in the use of software designing multimedia contents including text, graphics and animation.

Course Outcomes: Skills to students of graphic elements using Photoshop tool Flash-animation, as well as to all the multimedia elements into Web or a Web site using Dreamweaver.

Course Content:

Theoretical instruction:

- 1. ICT Fundamentals and media classification
- 2. Signal Digitalisation
- 3. Language and letter, symbols, characters and fonts
- 4. Acoustic base: sound, noise, speech and music
- 5. Language and oral communication
- 6. Audio signal acquisition systems
- 7. Audio signal transmission systems
- 8. Audio signal reproduction systems
- 9. Light and image perception
- 10. Bitmaps Graphic
- 11. Vector Graphic
- 12. Video signal acquisition systems
- 13. Video signal transmission systems
- 14. Hypertext, hipper media, Web technologies and multimedia programing
- 15. Multimedia Applications and Systems

Practical instruction (Problem solving sessions/Lab work/Practical training):

Laboratory exercises includes exercises from the three software tools: Adobe Photoshop for graphics, Adobe Dreamweaver for the development of Web and combine all the components of multimedia, and Adobe Flash for the development of animation and embedding interactivity.

- Bojković Z., Martinović D: Osnove multimedijalnih tehnologija, udžbenik, Visoka škola elektrotehnike i računarstva, Beograd, 2011.
- Jokanović D. Dimić G, Kuk K: Digitalne multimedije 1 Priručnik za laboratorijske vežbe, Visoka škola elektrotehnike i računarstva, Beograd, 2006.
- 3. Vaughan T:Multimedia: Making It Work, Eighth Edition, McGraw-Hill, 2011.
- 4. Savage T, Vogel K: An Introduction to Digital Multimedia, Jones & Bartlett Learning, 2009.
- 5. Chapman Nigel and Jenny: Digital Multimedia, John Wiley & Sons, Ltd., 3rd edition, 2009.

| Number of active lessons: 75 | | | Other classes: | | | |
|------------------------------|---|--------|-----------------|--------|--|--|
| Lectures: 30 | Exercises: 45 | Other: | Research study: | | | |
| Instruction method | ls: | | | | | |
| | Grading (maximum number of points: 100) | | | | | |
| Preliminary activiti | es Points | | Final Exam | Points | | |
| Lectures activities | 10 | | Written exam | 30 | | |
| Practical work | 50 | | Oral exam | 10 | | |
| Colloquium(s) | | | | | | |
| Seminar(s) | | | | | | |

Study Program: AVT, NRT, NET, EPO, RT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Electronics

Instructor(s): Slavica Marinković, PhD, Radmila Vukić, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: Familiarity with basic principles of electrical circuit theory and higher mathematics.

Course Objectives: Understanding of basic components of electronic devices, basic analog and digital circuits and their application.

Course Outcomes: Students will acquire knowledge about fundamental characteristics and application of electronic components, basic analog electronic circuits, power supplies and logic circuits.

Course Content:

Theoretical instruction:

- Introductory lecture (electronics engineer professional profile, organization and course syllabus, relation to other courses).
- 2. Electronics, importance, fields of applications, history and development of electronics.
- 3. Atomic structure of matter, basic characteristics of conductors, semiconductors and insulators.
- 4. Electronic circuit components: resistors, capacitors, and inductors.
- 5. Integrator and differentiator circuits, electronic circuit components: transformers, relays, quartz crystal
- 6. PN junction, diodes.
- 7. Bipolar junction transistors.
- 8. Field effect transistors (JFET, MOSFET).
- Transistor amplifier circuits: single-stage amplifier with bipolar junction transistors and field effect transistors. Multilayer silicon devices: thyristors.
- 10. Operational amplifier: basic circuits with operational amplifiers.
- 11. Power supplies: rectifiers, linear and switching regulators, and DC-DC converters.
- 12. Logic circuits: operation principles and basic characteristics.
- 13. Basic combinational and sequential circuits.
- 14. Oscillators: RC and oscillators with quartz crystal.
- 15. Knowledge test.

Practical instruction (Problem solving sessions/Lab work/Practical training):

Instruments and laboratory equipmen, Linear circuits with passive components, Semiconductor diodes and basic diode circuits, Transistors and basic circuits with bipolar junction transistors, Operational amplifier, Logic circuits, D flip-flop

Textbooks and References:

- 1. V. Drndarević, Elektronika, Saobraćajni fakultet, Beograd, 2005.
- 2. P. Bošnjaković, Osnovi elektronike, Viša elektrotehnička škola, Beograd, 2006.
- 3. S.Tešić, M. Vasiljević, Osnovi elektronike, Građevinska knjiga, Beograd, 2000.
- P. Bošnjaković, B. Hadžibabić, S. Marinković, Osnovi elektronike 1 i 2, elektronika, priručnik za laboratorijske vežbe, Viša elektrotehnička škola, Beograd, 2008.
- 5. R. Ramović, Komponente telekomunikacionih uređaja, Viša tehnička PTT škola, Beograd, 2000.

| Number of active lessons: 75 | | | Other classes: | |
|------------------------------|---------------|------------------|-----------------|--|
| Lectures: 30 | Exercises: 15 | Other: 30 | Research study: | |

Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | |
|---|--------|--------------|--------|--|
| Preliminary activities | Points | Final Exam | Points | |
| Lectures activities | 10 | Written exam | 60 | |
| Practical work | 10 | Oral exam | | |
| Colloquium(s) | 20 | | | |
| Seminar(s) | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Fundamentals of TV

Instructor(s): Jadranka Ajčević

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: to introduce the basic principles and postulates underlying the functioning of the television

Course Outcomes: to identify the structure and form of analog and digital video signals, and devices to work with different levels of guality in television systems.

Course Content:

Theoretical instruction:

- 1. Light and visual system.
- 2. The science of color. The basic principles of colorimetry.
- 3. Analysis, synthesis and image synchronization.
- 4. The sensors for the analysis and synthesis of images.
- 5. The image resolution. Bandwidth video signals. Frequency characteristic of video signals.
- 6. Gamma correction. Correction of details in the picture.
- 7. The formation and transmission of analog video signals. Composite and component analog video signals.
- 8. Analog television systems (PAL, NTSC and SECAM).
- 9. The media for transmission of audio / video signals. Connectors.
- 10. Digitization of video signals. Measurement. Quantization. Coding.
- 11. Digital video signals. Composite and component digital video signals.
- 12. Analog and digital transmission of television signals.
- 13. General principles of compression. Compression of images. Compression of images with movement.

Practical instruction (Problem solving sessions/Lab work/Practical training):

Measurement equipement and test signals. The function and role of individual devices inside of a TV system. Connectors in television. Convert light into electrical values. Analog video signals. Image source synchronisation. The influence of video signal levels on the quality of reproduced images. Impact of changes in the level of video signal and its frequency characteristics on the quality of reproduced TV images. Measurement of the signal reception of terrestrial TV broadcasting. Measurement of the signal reception of satellite TV broadcasting.

Textbooks and References:

- 1. M. Petrovic lectures in the form of PowerPoint presentations;
- 2. M. Petrovic Laboratory practicum, High School of Electical and Computer Engineering of Applied Studies in Belgrade, 2012.
- 3. M.Weise, D. Weynand, How Video Works, SAD, Focal Press, 2004.
- 4. Robert L. Hartwig, "Basic TV Technology: Digital and Analog", Fourth Edition, Focal Press, 2005.

Number of active lessons: 75 Other classes: Exercises: 45 Other: Lectures: 30 **Research study:** Instruction methods: Grading (maximum number of points: 100) Preliminary activities Points **Final Exam** Points Lectures activities 5 30 Written exam 20 Practical work Oral exam Colloquium(s) 15 30 Seminar(s)

Study Program: AVT, NRT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Computer Graphics

Instructor(s): Professor Dusan Starcevic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: The program aims to familiarize students with basic theoretical knowledge and practical approaches in the scientific field of computer graphics. The program takes place during one semester of teaching through lectures and exercises.

Course Outcomes: Students will be able to effectively use chosen commercial software systems in the field of computer graphics and follow the technological advances.

Course Content:

Theoretical instruction:

- 1. Introduction. Computer Graphics. Interactive Computer Graphics,
- 2. Graphics Hardware,
- 3. Output Only Technology,
- 4. Input Technology,
- 5. Interaction and Logical Devices.
- 6. Fundamentalsof Interactive Graphics Programming,
- 7. 2D-Graphics. Representing the Real World. Coordinate Systems and Transformations.
- 8. Geometrical Transformations.
- 9. Basic Raster Algorithms. Scan-Converting Lines. Scan-Converting Characters.
- 10. Region Filling. Polygon Clipping.
- 11. Scan-Converting Polygons.
- 12. Algorithms for Removing Hidden Edges and Surfaces.
- 13. Computer Animation.
- 14. Graphical User Interfaces(GUI).

Practical instruction (Problem solving sessions/Lab work/Practical training):

Working with vector graphics. Working with bit mapped graphics. Prepress.

Syllabus complies with the recommendations of IEEE/ACM Computing Curriculum: CC2001 Computer Science Body of Knowledge: CS-GV1-5.

- 1. J. Foley, A. van Dam, S. Feiner, J. Hughes, Computer Graphics, Principles and Practice, Addisson, Wesley, 1997.
- John F. Hughes, Andries van Dam, Morgan McGuire, David Sklar, James D. Foley, Steven K. Feiner, Kurt Akeley, Computer Graphics: Principles and Practice (3rd Edition), 2012 (u najavi)
- 3. Shirley, P., Fundamentals of Computer Graphics, A K Peters Publishing Company, 2002.
- Ed Angel, Interactive Computer Graphics, A Top-down Approach with OpenGL (Third Edition), Addison-Wesley Publishing Company, 2003.
- D. Starcevic, K. Kuk, G. Dimic, M. Stupar, N. Vuckovic, Racunarska grafika praktikum za laboratorijske vezbe, VISER, Belgrade, 2009.

| Number of active lessons: 75 | | | | Other classes: |
|---|---------------|----------------|---------------------|----------------|
| Lectures: 30 | Exercises: 45 | Other: | Research study: | |
| Instruction methods: Lectures, laboratory exercises, consultations, colloquiums, knowledge tests, final exam. | | | | |
| | Grading | g (maximum num | ber of points: 100) | |
| Preliminary activiti | es Points | Fi | nal Exam | Points |
| Lectures activities | 5 | W | ritten exam | 50 |
| Practical work | 25 | Or | al exam | |
| Colloquium(s) | 20 | | | |
| Seminar(s) | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Audio electronics

Instructor(s): Dragan Drincic

Course Status: Elective/compulsory

Number of ECTS: 6

Prerequisites: Basics of Electro acoustics, Basics of Audio Techniques

Course Objectives: To give student the knowledge of concepts and principles concerning audio equipment and component

Course Outcomes: To be able to fully understand working principles of audio equipment and component.

Course Content:

Theoretical instruction:

- 1. Introduction to audio electronics.
- 2. Passive electronic components.
- 3. Operational amplifiers.
- 4. Audio switching and connecting components.
- 5. Basic circuits for measuring and indicating the level of audio signals.
- 6. Electronic filters and equalizers.
- 7. Loudspeakers and loudspeaker crossovers.
- 8. Small signal audio amplifiers (microphone, correction, line).
- 9. Audio transformers (microphone, line, autotransformers).
- 10. Power amplifiers (class A, B, AB, D).
- 11. Rectifiers and power supplies.
- 12. Audio signal generators and noise sources.
- 13. Dynamic signal processor circuits.
- 14. Audio A D and D A converters.
- 15. Audio circuits basic measurements.

Practical instruction (Problem solving sessions/Lab work/Practical training):

1. Audio signals; 2. Passive components of audio devices, 3. Operational amplifiers; 4. Connectors and cables; 5. Electric filters and equalizers; 6. Loudspeaker crossovers, 7. Power amplifiers, 8. Small signal audio amplifiers; 9. Microphone basic parameters; 10. Loudspeakers and loudspeaker boxes, 11. A-D and D-converters.

Textbooks and References:

- 1. T. Jelaković, Tranzistorska audiopojačala, Tehnička knjiga, Zagreb, 1974.
- 2. G. Ballou, Handbook for sound engineers, Howard W. Sams & Co, 1988.
- 3. M. Leach, Introduction to Electroacoustics and Аудио Amplifier design, Kendall Nut Publ. Co., 2003.
- 4. J. L. Hood, Audio electronics, Newnes, Elsevier, 2004.
- 5. D. Self, Audio Power Amplifier Design Handbook, Fourth ed., Elsevier, 2006.
- 6. J. L. Hood, Valve and Transistor Audio Amplifiers, Newnes, Elsevier, 2007.
- 7. D. Self, Small Signal Audio Design, Focall Press, 2010.
- 8. K. C. Pohlmann, Principles of Digital Audio, Sixt ed., McGraw Hill, 2011.
- 9. D. Drinčić, Audioelektronika, VIŠER (Electronic publications), 2011

| Number of active lessons: 75 | | | Other classes: | |
|------------------------------|---------------|------------------|-----------------|--|
| Lectures: 30 | Exercises: 15 | Other: 30 | Research study: | |

Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | | |
|---|--------|--------------|--------|--|--|
| Preliminary activities | Points | Final Exam | Points | | |
| Lectures activities | | Written exam | 40 | | |
| Practical work | 20 | Oral exam | | | |
| Colloquium(s) | 30 | | | | |
| Seminar(s) | 10 | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: English Language

Instructor(s): Vesna Jokanovic

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: is to train students to be able to communicate in English using general or professional terms.

Course Outcomes: In the end of semester students will be able to communicate in English and to use professional literature.

Course Content:

Theoretical instruction:

- 1. Everyday uses of computers. Types of computers
- 2. Parts of computer. Keyboard and mouse
- 3. Interview: Student. Input devices
- 4. Output devices. English tenses active form
- 5. Storage devices. Graphical user interface
- 6. Interview: Computing support assistant. English tenses continuous form
- 7. Networks. Communications
- 8. The Internet 1: E-mail and newsgroups. The passive voice
- 9. The Internet 2: The World Wide Web. Interview: The website designer
- 10. World processing. Databases and spreadsheets
- 11. Graphics and multimedia. Indirect speech
- 12. Programming. Interview: Analyst/programmer. Low-level systems
- 13. Future trends. Sequence of tenses
- 14. Interview: IT Manager. Issues in computing
- 15. Careers in computing. Interview: Systems manager

Practical instruction (Problem solving sessions/Lab work/Practical training): Reading, writing, pronunciation and listening according to class subject.

Textbooks and References:

- 1. Jovanovic, English in electrical engineering, Visa elektrotehnicka skola, Beograd 1991.
- 2. E.H. Glendinning, J. McEwan, Basic English for computing, Oxford University Press 2001.
- 3. Different English language grammars, journals, Internet texts etc.

| Number of active lessons: 75 | | | | Other classes: |
|------------------------------|---------------|------------------|-----------------|----------------|
| Lectures: 30 | Exercises: 30 | Other: 15 | Research study: | |

Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | | |
|---|--------|--------------|--------|--|--|
| Preliminary activities | Points | Final Exam | Points | | |
| Lectures activities | | Written exam | 30 | | |
| Practical work | 10 | Oral exam | | | |
| Colloquium(s) | 60 | | | | |
| Seminar(s) | | | | | |

Study Program: AVT, EPO, NET, NRT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Application Software

Instructor(s): Radmila Vukić, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: Knowledge of computer operating system, file management.

Course Objectives: Students training for using standard aplication software and including in the digital society.

Course Outcomes: Students will understand the principles of the use of application software and know how to use programes for word processing, presentation and cross calculations, using a basic Internet service, and to combine the implementation of various programs

Course Content:

Theoretical instruction:

- Introductory lecture (the organization and content of the course) Application software, Microsoft Office, Open Office.
- 2. Basic word processing techniques.
- 3. Entering and editing text, formatting text, characters, paragraphs and pages.
- 4. Advanced word processing techniques. Embedding objects in text.
- 5. Tables; Equation.
- 6. Processing longer texts; Styles.
- 7. Spreadsheets. Basic concepts.
- 8. Edit cell content, editing a worksheet; principle.
- 9. Formatting Spreadsheets. Examples.
- 10. Functions, basic application techniques.
- 11. Diagrams. Database. Advanced techniques.
- 12. Presentations. Basic rules to create and display presentations, making slide.
- 13. Presentations. Handling components slide. Installation of object. Animation.
- 14. Internet services. Search, e-mail, discussion lists, publishing presentations on the Internet.
- 15. Combined use of different programs.

Practical instruction (Problem solving sessions/Lab work/Practical training):

Practical classes follow a program of lectures.

- 1. R. Vukić, D. Perić, I. Vlajić-Naumovska, Aplikativni softver, VIŠER, Beograd, 2011., 3th Edition of handbook.
- 2. ECDL literature- Modules 3,4,6 and 7
- 3. On line preparation: www.ecdltest.rs

| Number of active lessons: 75 | | | Other classes: | |
|--|---|--|---|--|
| xercises: | Other: 45 | Research study: | | |
| Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam. | | | | |
| Grading | ı (maximum nuı | mber of points: 100) | | |
| Points | I | inal Exam | Points | |
| | ١ | Written exam | 40 | |
| | (|)ral exam | | |
| 20 | | | | |
| 40 | | | | |
| | ns: 75 xercises: ecctures, problem sol am. Grading Points 20 40 | ns: 75 cercises: Cercises: Cercises: Cercises: Cercises: Cercises: Cercises: Cercise: Cercise: C | ns: 75 eccrises: Other: 45 Research study: ecctures, problem solving sessions, laboratory exercises, assign am. Grading (maximum number of points: 100) Points Final Exam Points Viriten exam 20 40 Viriten exam | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: TV Systems and Video Technologies

Instructor(s): Mile Petrovic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: Knowledge of basic concepts of television picture

Course Objectives: to introduce the technology and equipment used in television, as well as practical design and implementation of analog and digital TV systems.

Course Outcomes: to enable engineers to work in the TV studio, and manager - of Engineers for the design, implementation, maintenance and purchase of TV equipment.

Course Content:

Theoretical instruction:

- 1. Introduction..Analogni and digital TV systems.
- 2. Standards in analogue and digital television.
- Understanding the technology and equipment used in TV systems: servers, cameras, magnetoscopes, monitors, mixers, A / V distribution, speakers, microphones ...
- 4. Synchronization of analog and digital devices in the TV system. The timing device in the TV system.
- 5. Design of analog TV systems.
- 6. Design of digital TV systems.
- 7. Design of hybrid TV system.
- 8. Design of analog and digital TV systems via the Internet.
- 9. TV in car (SD and HD).
- 10. Realization of TV system with devices of different formats.
- 11. Monitoring systems in the TV (CRT, LCD, plasma, LED, multiviewer-and measurement equipment).
- 12. Hardware and software for automatic broadcasting of TV programs.
- 13. Video (Playout) servers.

Practical instruction (Problem solving sessions/Lab work/Practical training):

Design and implementation of an analog video syste. Design and realization of analog audio systems. Realization of an analog video / audio system. Design and implementation of a hybrid TV system (analog + digital equipment). Design and implementation of digital TV systems. The TV system with playout servers - the practical work. Computer-broadcast TV program. Exercise on TV: RTS and FIRST.

- 1. M. Petrović: Practicum for Laborat. Exercises, High School of Computer Science, Belg. 2010
- M. Petrović: Material for lectures for the TV systems and video technologies. Internal electronic edition for the High School of Computer Science, Belg. 2011.
- 3. M. Noll: Television Technology: Fundamentals and Future Prospects, Artech House, Norwood, MA. 2006.
- S. Roberts: Engineering Television Broadcast, Cable and Satellite, Part 1 and Part 2: Fundamentals, Pentech Press, London, 2005.

| Number of active lessons: 75 | | | | Other classes: | |
|---|---------------|----------------|---------------------|----------------|--|
| Lectures: 30 | Exercises: 45 | Other: | Research study: | | |
| Instruction methods: Teaching is organized through lectures and laboratory exercises. | | | | | |
| | Grading | g (maximum num | ber of points: 100) | | |
| Preliminary activitie | es Points | Fi | nal Exam | Points | |
| Lectures activities | 5 | W | ritten exam | 30 | |
| Practical work | 20 | 01 | ral exam | | |
| Colloquium(s) | 15 | | | | |
| Seminar(s) | 30 | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Recording Studios Equipment

Instructor(s): Dragan Drincic

Course Status: : Elective/compulsory

Number of ECTS: 6

Prerequisites: Basics of Electro acoustics, Basics of Audio Technics

Course Objectives: To give student the knowledge of concepts and principles concerning studio systems and equipment

Course Outcomes: To be able to fully understand and work in the proper studio environment

Course Content:

Theoretical instruction:

- 1. Basic characteristics and subdivision of audio equipment.
- 2. Analog audio mixers first part.
- 3. Analog audio mixers second part.
- 4. Digital audio mixers.
- 5. Audio signal flow.
- 6. Filters and equalizers.
- 7. Dynamic signal processors.
- 8. Signal delay processors and artificial reverberation equipment.
- 9. Analog signal recording equipment.
- 10. Digital audio recording equipment.
- 11. Audio signal metering.
- 12. Audio signal monitoring.
- 13. Audio equipment connections and adjustment.
- 14. Power supplying and grounding.
- 15. Basic control room and studio parameters.

Practical instruction (Problem solving sessions/Lab work/Practical training):

1. Analog audio mixers - Understanding the functions and convenient operation; 2. Digital audio mixers - Understanding the functions and convenient operation; 3. Audio processors - practical work and setting; 4. Artificial reverberation processors - practical work and setting, 5. Studio and control room equipment connection; 6. Audio signal monitoring, measuring and level adjusting.

Textbooks and References:

- 1. G. Ballou, Handbool for sound engineers, Howard W. Sams & Co, 1988.
- 2. F. A. Everest, Critical Listening Skills for audio Professionals, Course Technology.
- 3. J. M. Woram, Sound recording Handbook, Howard W. Sams Co., 1989.
- 4. J. Eargle, Handbook of Recording Engineering, Springer, 2002.
- 5. J. Borwick, Sound Recording Practice, Oxford University Press, 2001.
- 6. B. Owsinski, Recording Engineer's Handbook, Artist pro, 2005.
- 7. M. Mijić, Audio sistemi, Akademska misao, 2011.
- 8. D. Drinčić, Studijska audiotehnika, (eletornic edition), VIŠER, 2011.

| Number of active lessons: 75 | | | Other classes: | |
|------------------------------|---------------|------------------|-----------------|--|
| Lectures: 30 | Exercises: 15 | Other: 30 | Research study: | |
| | | | | |

Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | | |
|---|--------|--------------|--------|--|--|
| Preliminary activities | Points | Final Exam | Points | | |
| Lectures activities | | Written exam | 40 | | |
| Practical work | 20 | Oral exam | | | |
| Colloquium(s) | 30 | | | | |
| Seminar(s) | 10 | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Image recording

Instructor(s): Jordan R. Isailović, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Combining the knowledge and techniques for digital image recording and processing with esthetic principles of digital photography.

Course Outcomes: Students will learn techniques of recording and editing digital images.

Course Content:

Theoretical instruction:

- 1. Development of digital photography. Construction of a digital photo camera
- 2. Characteristics of a digital photo camera: lens construction, types of lenses
- 3. Correct exposure in digital photography: problems with exposure, Exposure value and dynamic range. Creative exposures.
- 4. Aperture and shutter speed. Depth of field.
- 5. Composition in photography
- 6. Architecture and landscape photography: problems of perspective distortion
- 7. Sensor construction in digital photo cameras. Sensor sensitivity and the problem of 'noise' in digital photography
- 8. Position of light in photography, types and sources of light, color temperature.
- 9. Dynamic range and tonal quality in digital photography
- 10. Digital images formats, RAW format
- 11. HDR digital image, techniques for shooting and creating HDR photography
- 12. Portfolio defining the individual students' style for series of photographs: choosing a theme and lenses.

Practical instruction (Problem solving sessions/Lab work/Practical training): Recording and editing the digital images in Adobe Photoshop, Photomatix.

- 1. Bruce Barnbaum, The Art of Photography: An Approach to Personal Expression, Rocky Nook, 2010.
- 2. Dragoljun Kažić, Fotografija, Zavod za udžbenike i nastavna sredstva, Beograd, 1996.
- 3. Ansel Adams, The Camera, Ansel Adams, 1995.
- Bryan Peterson, Understanding Exposure: How to Shoot Great Photographs with a Film or Digital Camera, Amphoto Books, 2004.
- 5. Scott Kelby, The Digital Photography Book, Peachpit Press, 2006.
- 6. Michael Freeman, The Photographer's Eye: Composition and Design for Better Digital Photos, Focal Press, 2007.

| Number of active le | Other classes: | | | | | |
|---|----------------|------------------|-----------------|--------|--|--|
| Lectures: 30 Exercises: 30 | | Other: 15 | Research study: | | | |
| Instruction methods: | | | | | | |
| Grading (maximum number of points: 100) | | | | | | |
| Preliminary activiti | es Points | | Final Exam | Points | | |
| Lectures activities | | | Written exam | 40 | | |
| Practical work | | | Oral exam | | | |
| Colloquium(s) | 40 | | | | | |
| Seminar(s) | 20 | | | | | |

Other classes

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: MIDI and Sound Synthesis

Instructor(s): Ljiljana Stanimirović, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: DSP Course

Course Objectives: Working in the field of Digital Signal Analysis and Processing and Sound Synthesis, it's important to know basic algorithms and procedures of digital and analog signal processing, basic concepts of MIDI protocols and device communication in different audio and video applications, machines, devices, gadgets, etc.

Course Outcomes: Better understanding of digital signals, digital and analog signal processing and systems, basic concepts of DSP technologies and MIDI concept.

Course Content:

Theoretical instruction:

- 1. MIDI protocol: History and development.
- 2. MIDI: messages structure.
- 3. General MIDI, MIDI time code.
- 4. Synchronization via MIDI protocol.
- 5. Introduction to sound synthesis.
- 6. Additive synthesis.
- 7. Subtractive synthesis.
- 8. FM synthesis 1
- 9. FM synthesis 2.
- 10. Wavetable synthesis.
- 11. Granular synthesis.
- 12. Physical modeling.

Practical instruction (Problem solving sessions/Lab work/Practical training):

- 1. Demonstrations in different software modules.
- 2. MIDI and DSP equipment and devices.

Textbooks and References:

- 1. Stanimirović, Lj. MIDI Systems, School of electrical and computer engineering, 2008, Belgrade.
- 2. Stanimirović, Lj. MIDI Systems, School of electrical and computer engineering, 2006, Belgrade.
- 3. Software and Device Manuels.
- 4. H.Henle. Das TonstudioHandbuch, GC Carstensen, 2001.

Number of active lessons: 75

| Number of active le | other classes. | | | | | | |
|--|----------------|--------|-----------------|--------|--|--|--|
| Lectures: 45 | Exercises: 30 | Other: | Research study: | | | | |
| Instruction methods: Lectures, laboratory exercises, consultations, colloquiums, final exam. | | | | | | | |
| Grading (maximum number of points: 100) | | | | | | | |
| Preliminary activiti | es Points | | Final Exam | Points | | | |
| Lectures activities | | | Written exam | 70 | | | |
| Practical work | 30 | | Oral exam | | | | |
| Colloquium(s) | | | | | | | |
| Seminar(s) | | | | | | | |
| | | | | | | | |

Study Program: EPO, NET, NRT, RT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Fundamentals of Management

Instructor(s): Živorad M. Vasic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: The goal of this course is to acquire basic knowledge of business management systems.

Course Outcomes: After completion of the course students will be able to manage affairs in the existing company functions such as production, marketing, finance and others.

Course Content:

Theoretical instruction:

- 1. Introduction to management theory and definition of management.
- 2. The development of management theory.
- 3. Management processes. The division of the management process. Enterprise development.
- 4. Functional areas of management. Managing research and development, marketing.
- 5. Management, production management, human resources and finance.
- 6. Planning process. Types of plans and the content of individual plans.
- 7. The process of organizing. The principles of organization, definition and development of organizational structures
- 8. The process of personnel. Determining the need, finding, selecting and receiving personnel.
- 9. The process of leadership. Direction and coordination, and communication, decision-making managers.
- 10. The process control. Phase control, the principles of control, process control in the company.
- 11. The decision making process. Defining the decision-making on enterprise development, methods.
- 12. Information system for management of the company. Information and Information Systems.
- 13. Manager. The role, duties and selection of managers, selection, education and training of managers, leadership.
- 14. Project Management. The organization, planning, monitoring and supervision of project.
- 15. Strategic Management. Strategy and strategic analyses of goals.

Practical instruction (Problem solving sessions/Lab work/Practical training):

Auditory exercises follow the lectures, where students solve real problems and analizraju case studies in the field of planning and decision making

- Ž. Vasić, Z. Sajfert., Fundamentals of Management, College of Electrical Engineering and Computer Science Professional Studies, Belgrade, 2007.
- 2. P Jovanovic., Management, Theory and Practice, Faculty of Organizational Sciences, Belgrade, 2010.

| 2. 1 Jovanovic., N | nunugement, meory | unu i luctice, luce | any of organizational science | 25, Delgiude, 2010. |
|----------------------|-------------------|---------------------|-------------------------------|---------------------|
| Number of active le | Other classes: | | | |
| Lectures: 30 | Exercises: 45 | Other: | Research study: | |
| Instruction method | ls: | | | |
| | Grad | ling (maximum | number of points: 100) | |
| Preliminary activiti | ies Points | | Final Exam | Points |
| Lectures activities | 5 | | Written exam | |
| Practical work | | | Oral exam | 30 |
| Colloquium(s) | 50 | | | |
| Seminar(s) | 15 | | | |

Study Program: NET

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Electrical Lighting Design

Instructor(s): Ivana Vlajić-Naumovska

Course Status: Elective

Number of ECTS: 6

Prerequisites: Knowledge of basic concepts in electrical engineering.

Course Objectives: Introduce students to the design and execution of electrical lighting.

Course Outcomes: Students will be able to design and execution of electrical lighting.

Course Content:

Theoretical instruction:

- Introductory lecture (the organization and content of the course). Technical regulations for the execution of the electrical lighting. Standards. Technical recommendations.
- 2. Light as a physical and sensory phenomenon. Process of seeing. Effect of light. Light pollution. Review the history of lighting.
- 3. Photometric sizes and units.
- 4. Electrical light sources. Classification and the principles of operation.
- 5. Light emitting diode (LED). Physics. Technology. RGB systems. LED lamps.
- 6. Lamps. Classification, parts and photometric parameters.
- 7. Indoor lighting. Parameters of indoor lighting.
- 8. Calculation of indoor lighting. Integration of daylight and artificial light.
- 9. Lighting of industrial and sport facilities. Emergency and panic lighting.
- 10. Stage lighting. Broadcasting requirements. Concert, theater and ambient lighting. Lighting effects.
- 11. Outdoor decorative lighting. Lighting of buildings, monuments, fountains, bridges, public parks.
- 12. Lighting of roads.
- 13. Tunnel lighting.
- 14. Control systems of electrical lighting. Software and devices. Smart lighting.
- 15. Computer design of the electrical lighting.

Practical instruction (Problem solving sessions/Lab work/Practical training): Practical training program follows the lecture.

Textbooks and References:

- 1. Technical regulations JUS, SRPS, IEC, from section of the El
- I. Vlajić-Naumovska, N. Knežević, Electrical installations and lighting-manual for laboratory exercises, College of Electrical Engineering, Belgrade, 2009.
- M. Kostić, Guide trough the world of lighting technology, Faculty of Electrical Engineering University of Belgrade, 2000. (in Serbian)
- 4. M. Kostić, Lighting of roads, Faculty of Electrical Engineering University of Belgrade, 2006. (in Serbian)

| Number of active le | Other classes: | | | |
|---------------------|----------------|--------|-------------------|--|
| Lectures: 45 | Exercises: 15 | Other: | Research study:15 | |

Instruction methods: Interactive teaching methods work in lectures, exercises and consultations with the aim of encouraging student initiative. Numerical exercises are typical examples according to lessons.

| Grading (maximum number of points: 100) | | | | | |
|---|--------|--------------|--------|--|--|
| Preliminary activities | Points | Final Exam | Points | | |
| Lectures activities | | Written exam | 30 | | |
| Practical work | 10 | Oral exam | | | |
| Colloquium(s) | 25+25 | | | | |
| Seminar(s) | 10 | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Musical Instruments

Instructor(s): Sonja V. Krstić, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Students are educated to be able to read orchestral sheets and to achieve basic knowledge about musical instruments.

Course Outcomes: Students will be able to attend courses of Audio recording, Audio wiring and Musical production successfully.

Course Content:

Theoretical instruction:

- 1. Introduction. Notes, keys, note frequencies.
- 2. Intervals. Just and equal temperament scales.
- 3. Major scale. The circle of fifths.
- 4. Minor scale. Some other scales.
- 5. Notes and note duration. Pauses.
- 6. Rhythm. Tempo and dynamics. Articulation.
- 7. Basics of Musical acoustics: sound; intensity, pitch, timbre and duration of musical instrument tone.
- 8. String instruments. Tonal and directional characteristics.
- 9. Woodwind and brass instruments. Tonal and directional characteristics.
- 10. Keyboard instruments. Tonal and directional characteristics.
- 11. Percussion instruments.
- 12. Electric and electronic instruments.
- 13. Human voice. Chorus.
- 14. Chamber orchestra, philharmonic orchestra and other ensembles.

Practical instruction (Problem solving sessions/Lab work/Practical training):

Practical training program follows the lecture.

- 1. Krstić S. : Acoustics of Musical instruments, VIŠER, Belgrade, 2009.
- 2. Krstić S., Cerić V.: Musical instruments laboratory manual 1, VIŠER, Belgrade, 2011.
- 3. Krstić S., Cerić V.: Musical instruments laboratory manual 2, VIŠER, Belgrade, 2007.
- 4. J.Meyer: Acoustics and the Performance of Music.

| Number of active le | | Other classes: | | | | |
|---|----------------------------|----------------|-----------------|--------|--|--|
| Lectures: 45 | Lectures: 45 Exercises: 30 | | Research study: | | | |
| Instruction methods: Lectures, laboratory exercises, consultations, written exam. | | | | | | |
| Grading (maximum number of points: 100) | | | | | | |
| Preliminary activiti | es Points | Fi | inal Exam | Points | | |
| Lectures activities | 10 | W | /ritten exam | 30 | | |
| Practical work | 30 | 0 | ral exam | | | |
| Colloquium(s) | | | | | | |
| Seminar(s) | 30 | | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Room Acoustics

Instructor(s): Dragan Drincic

Course Status: Elective/Compulsory

Number of ECTS: 6

Prerequisites: Basics of Electro acoustics, Basics of Audio Technics.

Course Objectives: To give student the knowledge of concepts and theories concerning the acoustical properties of buildings, building elements and materials, noise prevention and abatement and of rules, standards, and legislation concerning noise

Course Outcomes: To be able to solve problems and implement solutions and rules concerning acoustical properties of buildings, building elements and materials, noise prevention and abatement.

Course Content:

Theoretical instruction:

- 1. Basic definitions and terms.
- 2. Spectral sound analisys.
- 3. Noise characteristics, measurement and reduction.
- 4. Sound transmission through partitions.
- 5. Sound muffers.
- 6. Sound field in enclosed spaces (volume of room, reverberation time).
- 7. Sound absorbers.
- 8. Sound diffusers.
- 9. Room impulse response.
- 10. Design of rooms for speech and music.
- 11. Recording studio and control room design.
- 12. Acoustics of worship spaces.
- 13. Rooms for acoustical measurements (reverberation roons and anechoic rooms).
- 14. Room acoustics measurements.

Practical instruction (Problem solving sessions/Lab work/Practical training):

1. Equipment and measuring signals; 2. Noise level and spectrum; 3. Transmission loss of partitions; 4. The measurement bandwidth of floors and ceilings; 5. Transmission loss of facades; 6 Reverberation time – calculation and measurement; 7. Distribution of sound pressure levels in rooms at low frequencies; 8. Frequency characteristics of the source in the room; 9. Acoustic distortions due to comb-filtering; 10. Room impulse response - measurement and analysis; 11. Measurement of acoustical characteristics of room using the software package EASERA. 12. Simulation of room acoustics.

Textbooks and References:

- 1. H. Parkin, H.R. Hamfriz, Akustika, buka i zgrade, Građevinska knjiga, Beogad, 1969.
- 2. T. Jelaković, Zvuk, sluh, arhitektonska akustika, Školska knjiga, Zagreb 1978.
- 3. M. Mijić, Akustika u arhitekturi, Nauka, Beograd 2000.
- 4. M. Barron, Auditorium Acoustics and Architectural Design, Spon Press, 2010.
- 5. D. Drinčić, Akustički dizajn prostorija, VIŠER (electronic edition), Belgrade 2011.

| Lectures: 30 Exercises: 15 Other: 30 Research study: | Number of active le | Other classes: | | | |
|--|---------------------|----------------|------------------|-----------------|--|
| | Lectures: 30 | Exercises: 15 | Other: 30 | Research study: | |

Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | | |
|---|--------|--------------|--------|--|--|
| Preliminary activities | Points | Final Exam | Points | | |
| Lectures activities | | Written exam | 40 | | |
| Practical work | 20 | Oral exam | | | |
| Colloquium(s) | 30 | | | | |
| Seminar(s) | 10 | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: TV Cameras

Instructor(s): Jadranka M. Ajčević

Course Status: Elective

Number of ECTS: 6

Prerequisites: Picture Filming Techniques

Course Objectives: Acquiring knowledge of the TV cameras, as well as mastering the recording techniques with TV cameras

Course Outcomes: Training for the work with a TV camera.

Course Content:

Theoretical instruction:

- 1. General block diagram of TV camera, functional description of sub-assemblies of TV camera
- 2. Optical system of TV camera: objective, system for color separation, filters.
- 3. Optoelectronic system of TV camera, CCD sensors.
- 4. Signal processing system for TV camera. Control system for TV cameras, power supply.
- 5. Additional equipment : viewfinder, audio equipment, stands and supports
- 6. Camcorders (functional description, sub-assemblies, division, file formats).
- 7. Camera selection, analysis of parameters for the camera selection.
- 8. Lighting (type, the division, setting up lighting).
- 9. The composition of images (the basic elements of image, scene composition).
- 10. TV cameraman, basic characteristics, work rules and obligations of TV cameraman.
- 11. TV studio camera (functional description, sub-assemblies, the division).
- 12. Special TV cameras, TV cameras in security systems, IP television cameras.
- 13. Special TV cameras, thermovision, TV cameras in medicine.

Practical instruction (Problem solving sessions/Lab work/Practical training):

- 1. Introduction to the TV camera sub-assemblies
- 2. Introduction to the operational functions of the TV cameras
- 3. Optical part of the TV cameras, automatic light regulation
- 4. Adjusting the white and black level
- 5. Camera power supply: battery types and battery handling
- 6. Diagnose the status of TV cameras and servicing of TV cameras
- 7. Lighting: devices for lighting, filters, setup lightning
- 8. The basic elements of television language, rules of recording
- 9. Independent recording in studio and on the field
- 10. Analysis of recorded TV material

- 1. J. Ajčević, Lecture notes (Electronic edition).
- 2. D.Martinović, Televizijske kamere, VETŠ, Beograd, 2001.
- 3. S. Zdravković, Video uredjaji, Zavod za udžbenike i nastavna sredstva, Beograd, 1999.

| | | | | Ţ | | |
|------------------------------|--------|--------|-----------------|-------------------------|----------------|--|
| Number of active lessons: 75 | | | | | Other classes: | |
| Lectures: 30 Exercises: 45 | | Other: | Research study: | | | |
| Instruction meth | ods: | | | | | |
| | | Grad | ling (maximun | n number of points: 100 |) | |
| Preliminary activ | rities | Points | | Final Exam | Points | |
| Lectures activitie | s | 10 | | Written exam | 30 | |
| Practical work | | 40 | | Oral exam | | |
| Colloquium(s) | | 20 | | | | |
| Seminar(s) | | | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Digital TV

Instructor(s): Jadranka Ajčević

Course Status: Elective

Number of ECTS: 6

Prerequisites: Fundamentals of television

Course Objectives: Introduction to the principles, technology and devices used in digital television.

Course Outcomes: Training for engineer tasks in the field of digital television.

Course Content:

Theoretical instruction:

- 1. The introductory lecture. Digital television systems in Europe and worldwide.
- 2. The structure of digital television systems (SDTV, EDTV and HDTV).
- 3. Digital interfaces. International standards ITU R BT 601/656.
- 4. Compression of images. JPEG and JPEG 2000 standards.
- 5. Compression of images with movement. Standards: H.261, H.264, MPEG-1, MPEG-2, MPEG-4 and MPEG-7
- 6. The formation of SDI signals. Multiplexing television signals. Channel coding.
- 7. Information and communication technology in television. Computer networks. Safety and security.
- 8. 3D and HD television systems.
- 9. Digital modulations.
- 10. Transmission and reception of digital signals via satellite.
- 11. The distribution of digital terrestrial broadcasting signal transmitters (DVB-T and DVB-T-2).
- 12. The distribution of digital signals via optical, coaxial and HFC networks.
- 13. Internet protocols. Transfer digital video signals over the Internet (IPTV).
- 14. Digital TV receivers

Practical instruction (Problem solving sessions/Lab work/Practical training):

- 1. Introduction to digital HD television studio.
- 2. Measurement of digital video signals.
- 3. Digital interfaces.
- 4. Configure the TV system with digital image sources.
- 5. Influence of different types and levels of compression on image quality.
- 6. The exercises in the software package Adobe Premiere Pro.

Textbooks and References:

- 1. J. Ajčević, Lecture notes (Electronic edition).
- 2. J. Arnold, M. Frater, and M. Pickering, "Digital Television", Technology and Standandards, 2007.
- 3. J. Ozer, Publishing Digital Video, Morgan Kaufmann Pub, 2004.
- 4. J. Whitaker, "Mastering digital television", London, 2006.

| Number of active le | Other classes: | | | |
|---------------------|----------------|--------|-----------------|--|
| Lectures: 30 | Exercises: 45 | Other: | Research study: | |

Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | | |
|---|--------|--------------|--------|--|--|
| Preliminary activities | Points | Final Exam | Points | | |
| Lectures activities | 10 | Written exam | 30 | | |
| Practical work | 40 | Oral exam | | | |
| Colloquium(s) | 20 | | | | |
| Seminar(s) | | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Sound Recording

Instructor(s): Dragan Drincic

Course Status: Elective

Number of ECTS: 6

Prerequisites: Basics of Electro acoustics, Basics of Audio Technics

Course Objectives: Introducing audio recording equipment and systems, and audio recording technics.

Course Outcomes: Upon the competition of the course students should be able to be a successful audio recording operators.

Course Content:

Theoretical instruction:

- 1. Basic principles of sound recording.
- 2. Microphones: Working principles. Characteristics, Models (Types).
- 3. General Response Characteristics of Microphone Pairs.
- 4. Introduction to Stereo Microphone Technique.
- 5. Matrixed Microphone Techniques: MS. Ambisonics.
- 6. Introduction to Surround Microphone Technique.
- 7. Microphone selection and placement for voice recording.
- 8. Introduction to musical instruments.
- 9. Microphone selection and placement for music recording.
- 10. Microphone selection and placement for audio effects and environmental sound recording.
- 11. Microphone selection and placement for picture sound recording (Film and TV).
- 12. Microphone selection and placement for recording and emitting live programs (Theatre, Sport events, Concerts,).
- 13. Microphone selection and placement for Radio broadcasting realization.
- 14. Levels and Metering: Meters. Gain Management. Phase and Correlation Meters.
- 15. Monitoring Configuration and Calibration.

Practical instruction (Problem solving sessions/Lab work/Practical training):

1. Studio and control room - basic characteristics, equipment and its interconnection; 2. Second Signal path from source to record device - configure the device, forwarding, recording and playback signals, 3. Voice recording; 4. Noise, effects and atmosphere recording, 5. Musical instruments recording - 1; 6. Musical instruments recording - 2; 7. Musical instruments recording - 3; 8. On-location recording.

Textbooks and References:

- 1. H. Kurtović, Osnovi stereofonske tehnike, Radio Beograd, 1968..
- 2. J. M. Woram, Sound recording Handbook, Howard W. Sams Co., 1989.
- 3. A. Nizbet, Snimanje i obrada zvuka, Univerzitet umetnosti, Beograd, 1990.
- 4. D.M. Huber, P.Williams, Professional Microphone Techniques, Mix books, 1998.
- 5. J. Eargle, Handbook of Recording Engineering, Springer, 2002.
- 6. P. Pravica, D. Drinčić, Elektroakustika, VIŠER, 2008.
- 7. B. Bartlett, J. Bartlett, Practical Recording Techniques, Focal Press, 2009.
- 8. D. Drinčić, Snimanje zvuka (Electronic edition), VIŠER, 2011.

| Number of active le | Other classes: | | | |
|---------------------|----------------|------------------|-----------------|--|
| Lectures: 30 | Exercises: 15 | Other: 30 | Research study: | |

Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | | |
|---|--------|--------------|--------|--|--|
| Preliminary activities | Points | Final Exam | Points | | |
| Lectures activities | | Written exam | 40 | | |
| Practical work | 20 | Oral exam | | | |
| Colloquium(s) | 30 | | | | |
| Seminar(s) | 10 | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Animation Basics

Instructor(s): Snežana Trstenjak

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Mastering basic and pratical knowledge in area od film and TV animation, Internet and digital animated presentation.

Course Outcomes: Students will be able to individually or in team work on two-dimensional animated forms from cartoons to experimental and collaged forms. Practic work is based on drawing and photographic technologies and programs such as CTP, Macromedia Flash, Photoshop and Premier.

Course Content:

Theoretical instruction:

- 1. Introdution, retinal persistence, terms, terminology, technology historical overview and development of classical film animation.
- Technology of classic animation from idea to projection copy. Finding possibilities, benefits and restrictions in using different softwares in making animated forms
- 3. Screenplay and storyboard. Sequential graphic arts
- 4. Stop frame technologies. Space technologies of animated film
- Condition of media, basic color mods (RGB, HSV, CMYK), input/outout video devices. Object transformation (translation, rotation and scaling)
- Cartoon computer technologies, from poses to card recording. Raster and vector graphic systems. Keyframe animation
- 7. Static and dynamic composition, framing, moving and timing. Camera animation. Digital picture and its values
- Technical animation. Animated graphic product design. Psychodynamics of color and interaction between colors, color palettes, text use
- 9. Laws od animation from stretching to exaggeration. Deformation. Movement analysis.
- 10. Implementation of speech from phonogram to phase vocalization
- 11. Animation for television, network and CD forms
- 12. Grammar, recording and directing of animated films, film planning, angles
- 13. Picture and audio editing of animated film
- Animation for special effects, computer animation, keyframe animation, 3D coordinate system and its inner transformations
- 15. Animator in professional environment, individual and team production

Practical instruction (Problem solving sessions/Lab work/Practical training):

Drawing practice, reducing characters to primary, individual drawnings, practice of stop-frame animation. Group practice of making animated forms, phonogram making and vocalization. Making animated forms by using different computer programs. Picture and audio editing of animated film.

Textbooks and References:

- 1. B. Dovinković, Mala škola crtanog filma, Zagreb 1983.
- 2. R. Williams, The Animator's survival kit, Faber and Faber, New York 1995.

| Number of active le | ssons: 75 | | | Other classes: | |
|--|------------------|------------------|-----------------|----------------|--|
| Lectures: 30 | Exercises: 15 | Other: 30 | Research study: | | |
| In stars we at a second s | | | | | |

Instruction methods: Lectures, with video projection, practical with projections and corrections.

| Grading (maximum number of points: 100) | | | | | | | |
|---|--------|--------------|--------|--|--|--|--|
| Preliminary activities | Points | Final Exam | Points | | | | |
| Lectures activities | 10 | Written exam | 60 | | | | |
| Practical work | 25 | Oral exam | | | | | |
| Colloquium(s) | | | | | | | |
| Seminar(s) | 5 | | | | | | |
| | | | | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Computer Animation 1

Instructor(s): Snežana Trstenjak

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Overcoming practical knowledge in areas of 3D modeling and computer animation.

Course Outcomes: Students will be able to individuly or in team work realize complex projects in area of intemidiate technical level of computer animation.

Course Content:

Theoretical instruction:

- Introdution, terms, terminology of computer animaltion. Condition of media, basic color mods (RGB, HSV, CMYK), input/output video devices. Polygonal representation of 3D objects, basic modeling, model construction from primary shapes
- Maya driver interface, organization of algorithmic nodes, improving working environment, additional modules, 3D system of coordination and its inner transformations, transformations (rotation, translation, scaling), view transformations, dip planes
- NURBS modeling, curves and surfaces, materialisation technology. Scene modeling, materialisation of complex contents, texture mapping, texture bump
- 4. Computer animation technologies, motion, timing, extreme technology, keyframe animation
- Virtual space and time, complex dynamic form organization, connecting technologies and moving dependency, deformation. Lighting 1 – digital light sources and material attributes (building, setting, control and managing), light and lighting basics, lighting artifacts
- Lighting 2 light atmosphere, advanced lighting of digital space, OSP, professional lighting. Visual language grammar, plans, angles, frames, timing, waiting. Computer animation directing. Camera animation
- Rendering 1 picture finalization technology, Maya's rendering algorithms, control and managing of process of finalization, raytrace rendering basics, anti-aliasing
- Rendering 2 artistic aspects of rendering, types of rendering (photorealistic and plastic-idealistic rendering), output formats, network rendering
- Advanced technologies of computer animation 1 procedural animation, dynamics, simulation. Advanced technologies of computer animation 2 – articulated structures animation, inverse cinematics, skeleton and skinning technology

Practical instruction (Problem solving sessions/Lab work/Practical training):

Maya workspace, basic operation and work modules. Modeling and materialization – polygonal and NURBS technologies Computer technologies of animation, extreme technologies (keyframe animation), pose and motion, path, conditioned movement, deformations. Light, camera and rendering

Textbooks and References:

- 1. The Art of Maya, Wavefront, 2000.
- 2. G. Maestri, Character nimation 2 Volume 2: Advanced Techniques, New Riders, Indiana, 2002.
- 3. J. Birn, Digital lighting and rendering, New Riders, USA, 2000.

| Lesterman 45 Brandison Others 20 Brands to the | Number of active le | ssons: 75 | | | Other classes: |
|---|---------------------|------------------|------------------|-----------------|----------------|
| Lectures: 45 Exercises: Other: 30 Research study: | Lectures: 45 | Exercises: | Other: 30 | Research study: | |

Instruction methods: Lectures, calculation exercises, laboratory exercises, consultations, term papers, defense laboratory exercises and written exam, oral exam.

| Grading (maximum number of points: 100) | | | | | |
|---|--------|--------------|--------|--|--|
| Preliminary activities | Points | Final Exam | Points | | |
| Lectures activities | 10 | Written exam | 60 | | |
| Practical work | 25 | Oral exam | | | |
| Colloquium(s) | | | | | |
| Seminar(s) | 5 | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Video Production

Instructor(s): Dragan S. Dimčić

Course Status: Elective

Number of ECTS: 6

Prerequisites: Television Cameras, Digital Television

Course Objectives: This course teaches technical processes of video production for training and recognition of interdependent technical and artistic aspects in production of audiovisual forms.

Course Outcomes: Students will be trained to efficiently understand technical and artistic aspects of video production, with the ability to work in video production team.

Course Content:

Theoretical instruction:

- 1. Forms of video expression.
- 2. History and technology of movies and video. Development of television, electronic and digital media.
- 3. Movies and television grammar (1st part).
- 4. Movies and television grammar (2nd part).
- 5. Movie and television genres.
- 6. Introduction to video analyses.
- 7. Video production crew.
- 8. Introduction to video technologies.
- 9. Preproduction and previsualization of audiovisual forms.
- 10. Production of audiovisual forms. Recording: camera, light and sound.
- 11. Recording techniques. Visual storytelling.
- 12. Postproduction of audiovisual forms.
- 13. Sound in video production.
- 14. Video production and new media. Interactivity. Digital art.

Practical instruction (Problem solving sessions/Lab work/Practical training):

Introduction to nonlinear editing software. User interface, Timeline, Project, Monitor Views. Importing assets and organizing. Editing trough Monitor View. Editing trough Timeline. Tools.Titles. Video filters and effects. Sound. Synchronizations sound and video. Working with Adobe Photoshop in Premiere Pro. Introduction to compositing. Adobe After Effects. Finalize project. Export and DVD authoring.

- 1. Grupa autora, Leksikon filmskih i televizijskih pojmova, Univerzitet umetnosti, Beograd 1997.
- 2. Gerald Millerson, Video Production Handbook, Focal Press 2001.
- 3. Ben Long, Sonja Schenk, Digital Filmmaking Handbook. Charles River Media 2002.

| Number of active lessons: 75 | | | | Other classes: | | |
|---|---------------|------------|------------------------|----------------|--|--|
| Lectures: 45 | Exercises: 30 | Other: | Research study: | | | |
| Instruction methods: Lectures, Practical Training | | | | | | |
| | Gradin | g (maximum | number of points: 100) | | | |
| Preliminary activiti | es Points | | Final Exam | Points | | |
| Lectures activities | 10 | | Written exam | 40 | | |
| Practical work | 50 | | Oral exam | | | |
| Colloquium(s) | | | | | | |
| Seminar(s) | | | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Sound System Engineering

Instructor(s): Dragan Drincic

Course Status: Elective

Number of ECTS: 6

Prerequisites: Basics of Electro acoustics, Basics of Audio Technics

Course Objectives: To give the student a comprehension of the engineering and use of audio systems.

Course Outcomes: To be able to solve problems and work with audio systems.

Course Content:

Theoretical instruction:

- 1. Audio system's architecture. Definitions
- 2. Microphones in sound systems (types, directivity, sensitivity)
- 3. Loudspeakers in sound systems (directivity, coverage, direct radiator loudspeakers, line sources, horns)
- 4. Outdoors sound systems (Inverse square law. EAD, PAG, NAG, Electrical power)
- 5. Indoors sound systems (Critical distance, Acceptable S/N, EAD, NAG, PAG, FSM, NOM, Electrical power)
- 6. Speech intelligibility (STI, TASTI, RASTIPA, Alcons).
- 7. Sound systems equipment (Preamplifiers and Mixers, Sound processors, Attenuators, Crossovers, Power amps.)
- 8. Central and distributed sound systems (Loudspeaker clusters, Line arrays, Ceiling Loudspeaker systems)
- 9. Sound system equalization and stage monitoring.
- 10. Audio systems connecting devices (cables, jack fields and connectors)
- 11. Sound system powering, grounding and interconnection
- 12. Applications: Sport facilities, Theaters, Concert halls, Airports, Conference rooms.
- 13. Multimedia presentation systems and Electronic acoustical enhancement systems
- 14. Software tools for sound system engineering.

Practical instruction (Problem solving sessions/Lab work/Practical training):

1. Measuring equipment and signals; 2. Attenuation of sound in the room with the distance from the source, 3. The subjective measurement of speech intelligibility; 4. Objective measurement of speech intelligibility; 5. Acoustic Gain measurement; 6 Critical distance and source directivity measurement; 7. Localization of sound sources - the priority effect; 8. Sound systems equalization, 9. Simple sound reinforcement system simulation in the software package EASE; 10 Complex sound reinforcement systems simulation in the software package EASE.

Textbooks and References:

- 1. Х. Ш. Куртовић, Озвучавање, Техничка књига, Београд 1982.
- 2. D. Davis, C.Davis, Sound System Engineering, Howard W. Sams & Co. 1987.
- 3. W. Ahnert, F. Steffen, Sound Reinforcement Engineering, E&FN Spon, 1999.
- 4. J. Eargle, C. Foreman, Audio Engineering for sound reinforcement, H. Leonard Co., 2002
- 5. B. McCarthy, Sound Systems: Design and Optimisation, Focal Press 2007.
- 6. D. Drinčić, Ozvučavanje, VIŠER (Electronic edition), 2011.

| Number of active le | ssons: 75 | | | Other classes: |
|--|------------------------------|---------------------|---------------------------|-------------------------------------|
| Lectures: 30 | Exercises: 15 | Other: 30 | Research study: | |
| Instruction method knowledge tests, final | s: Lectures, problem s exam. | olving sessions, la | boratory exercises, assig | nments, consultations, colloquiums, |
| | Gradi | ng (maximum n | umber of points: 100) | |
| Preliminary activiti | es Points | | Final Exam | Points |
| Lectures activities | | | Written exam | 40 |
| Practical work | 20 | | Oral exam | |
| Colloquium(s) | 30 | | | |
| Seminar(s) | 10 | | | |

44

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Field and Studio TV Production

Instructor(s): Jadranka Ajčević

Course Status: Elective

Number of ECTS: 6

Prerequisites: Knowledge of basic concepts of image and analog and digital television signals.

Course Objectives: the introduction to the study process and outside the study TV production technology and equipment used in the study and outside the study TV production.

Course Outcomes: is to enable engineers to work in the TV studio, and to work with devices that are used in the study and outside the study TV production.

Course Content:

Theoretical instruction:

- 1. The introductory lecture. Technologies used in the study and outside the study TV production.
- 2. Second Storage Media video (video servers, tape drives). Record and playback video signals of different formats.
- 3. TV studio. Light sources and lighting systems (heat, SRGB and LED).
- 4. Video Mixers and video effects.
- 5. Electronic graphics in television.
- 6. Communication systems in TV.
- Capture life in the studio with a blue or green background (chrome effect) directly to the computer processing and postproduction special effects.
- 8. Recording from two or more TV cameras in the system using a variety of effects on the video mixer.
- 9. TV in car (analog, SD and HD). Analysis of field recording and live broadcasts.
- 10. Simulation of direct broadcast recording three TV cameras using digital effects to video mixer, text and graphic files from your computer and hybrids for the sound of the audio mixer.
- 11. Electronic assembly. Time code. Linear and nonlinear editing.
- 12. Computer editing.
- 13. Systems for the distribution of TV signals (HFC, ADSL, IPTV). Integration of the distribution of television signals.

Practical instruction (Problem solving sessions/Lab work/Practical training):

Practical exercises accompanying the lectures with the implementation of specific tasks in digital HDTV studio. Students during the semester divided into groups made concrete mini project in HDTV studio.

- 1. M. Petrovic, lectures in the form of PowerPoint presentations.
- 2. M. Petrovic, Practicum for labs, the High School of Computer Science, Belgrade, 2010.
- 3. Mr. Lekakos, K. Chorianopoulos and G. Doukidis, "Interactive digital television," Technologies and Applications, 2008.
- 4. R. Musburger, "Single-Camera Video Production", Focal Press, 2010.
- O. Grau, T. Pullen, and G. A. Thomas, "A combined studio production system for 3-D capturing of live action and immersive actor feedback", IEEE Transactions on Circuits and Systems for Video Technology 14, March 2004.

| Number of active le | Other classes: | | | | |
|--|----------------|------------------|-----------------|--------|--|
| Lectures: 30 | Exercises: 30 | Other: 15 | Research study: | | |
| Instruction methods: Lectures, consultations, laboratory exercises and practical tasks in the multimedia HD TV studio. | | | | | |
| Grading (maximum number of points: 100) | | | | | |
| Preliminary activiti | es Points | Fi | nal Exam | Points | |
| Lectures activities | 10 | W | ritten exam | 30 | |
| Practical work | 40 | Or | al exam | | |
| Colloquium(s) | 20 | | | | |
| Seminar(s) | | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Marketing

Instructor(s): Dušan Bogdanović

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Gaining knowledge about marketing and its application

Course Outcomes: Acquiring knowledge about marketing and its application.

Course Content:

Theoretical instruction:

- 1. The definition of marketing. Market segmentation. The target market. Marketing mix. Product. Price. Distribution. Promotion. Tactics. Strategy.
- 2. The behavior of consumers. The hierarchy of needs. The decision making process.
- 3. The characteristics of the product. Classification of products.Positioning in the market. The product life cycle.
- 4. Promotion. Idea. Attention. Interest. Principles. Consumer. Promotion in the press. Classified ads. Large ads.
- Journals. Position and size of the ad. Making ads. The content of ads. Title. Writing ads.
- Promotion on radio and television. Making commercials. Elements of radio advertising. Techniques. Humor. Promotion on national television (public service). Planning of TV commercials. Production of TV commercials. Adaptability advertising program. Lifetime advertising.
- Other media. Advertising in public places. Sweepstakes and contests.Coupons. Fairs. Directories. Gifts business
 partners. Samples of the product. 0-800 phones. Sponsoring the event.
- 7. Direct marketing. Direct marketing and other media.
- 8. Price. Price competition. Psychological pricing. Prestige pricing. Promotional pricing.
- 9. Public Relations. Contact with the media. Press Releases.
- 10. Internet Marketing: Internet marketing plan.
- 11. SEO website optimization and web analytics.
- 12. Email a function of Internet marketing.
- 13. Blog in the function of Internet marketing.
- 14. Social networks as a channel of communication Internet marketing.
- 15. Text advertising on the web.

Practical instruction (Problem solving sessions/Lab work/Practical training):

The exercises are held in the computer lab, according to the program objects. For exercise to gain the skills and knowledge in marketing activities.

- 1. Dr Mlađen Vićentić, Marketing, udžbenik, VIPOS Valjevo, 2011.
- 2. Mr Dušan Bogdanović, Milica Jevremović, Priručnik iz marketinga, VISER, Beograd, 2010.

| Number of active lessons: 75 | | | | Other classes: | | |
|---|---------------|--------|-----------------|----------------|--|--|
| Lectures: 30 | Exercises: 45 | Other: | Research study: | | | |
| Instruction methods: Lectures, Exercises, Consultation(s), Colloquium(s), Seminar(s), Final Exam. | | | | | | |
| Grading (maximum number of points: 100) | | | | | | |
| Preliminary activiti | es Points | Fi | nal Exam | Points | | |
| Lectures activities | 10 | W | ritten exam | | | |
| Practical work | 20 | Or | al exam | 50 | | |
| Colloquium(s) | 20 | | | | | |
| Seminar(s) | | | | | | |

Other classes:

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Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Sound Design

Instructor(s): ZoranMaksimovic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Obtaining knowledge in the field of sound design, learning theory fundamentals as well as necessary practical tools and techniques.

Course Outcomes: Qualifying a student for jobs related to sound design.

Course Content:

Theoretical instruction:

- 1. Sound processing equipment used for sound design
- 2. Use of computers in the process of creating stereo image
- 3. Syncing audio and video signals
- 4. Sound editing
- 5. Using MIDI protocol for creating stereo image
- 6. Multichannel formats for sound reproduction
- 7. Mixing in 2-channel stereo
- 8. Mixing in 5.1 stereo

Practical instruction (Problem solving sessions/Lab work/Practical training):

- 1. Creating a short radio commercial
- 2. Designing sound for short video in 2-channel stereo
- 3. Designing sound for short video in 5.1 stereo

Textbooks and References:

- 1. Stanley R. A, Audio in Media, Wadsworth Publishing Company, 1998.
- 2. Nizbet A, Snimanjezvuka, FDU
- 3. Pravica P, Drincic D., Elektroakustika, Visa elektrotehnickaskola, 2006.

Number of active lessons: 75

| ectures: 30 Exercises: 45 |
|---------------------------|
|---------------------------|

Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | | | |
|---|--------|--------------|--------|--|--|--|
| Preliminary activities | Points | Final Exam | Points | | | |
| Lectures activities | | Written exam | 50 | | | |
| Practical work | 50 | Oral exam | | | | |
| Colloquium(s) | | | | | | |
| Seminar(s) | | | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Music Production

Instructor(s): Đorđe Petrović

Course Status: Elective

Number of ECTS: 6

Prerequisites: Sound Recording, Sound Design

Course Objectives: Mastering the practical and theoretical knowledge necessary to produce music.

Course Outcomes: Thetraining for workinmusic production.

Course Content:

Theoretical instruction:

- 1. Organization of workin thestudioto produce music.
- 2. The role of music producer in the process of creating music clip.
- 3. The use of stereo mic techniques in recording music.
- 4. The use of close-miking techniques in the multi-channel recordingmusic.
- 5. Specifics of the recording of acoustic musical instruments.
- 6. Specifics of the recording of electrical musical instruments.
- 7. Specifics of recording electronic musical instruments.
- 8. Audio filters in process of mixing music.
- 9. Handlind dynamic of audio tracks during mixing process.
- 10. Special effects in music production.

Practical instruction (Problem solving sessions/Lab work/Practical training):

- Multichannel recording o fpercussion instruments and drums. Organization of the recording, the division of work and communication with a musician.
- Recording of electric instruments.Organization of the recording, the division of work and communication with a musician.
- 3. Recording strings. Organization of the recording, the division of work and communication with a musician.
- 4. Recording wind instruments. Organization of the recording, the division of work and communication with a musician.
- 5. Recording main and supporting vocals. Organization of the recording, the division of work and communication with a musician.
- 6. Outside the studio recordin gmusic.
- 7. Mixing music in studio enviriment.

Textbooks and References:

- 1. Nizbet A, Snimanjezvuka, FDU
- 2. Petrović Đ, Snimanje zvuka i tonska režija, skripte FMU

| Number of active lessons: 75 | | | | Other classes: |
|------------------------------|---------------|--------|-----------------|----------------|
| Lectures: 45 | Exercises: 30 | Other: | Research study: | |

Instruction methods: Lectures, problem solving sessions, laboratory exercises, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | |
|---|--------|--------------|--------|--|
| Preliminary activities | Points | Final Exam | Points | |
| Lectures activities | | Written exam | 50 | |
| Practical work | 50 | Oral exam | | |
| Colloquium(s) | | | | |
| Seminar(s) | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Multimedia Production

Instructor(s): Jadranka Ajčević

Course Status: Elective

Number of ECTS: 6

Prerequisites: Basic knowledge of television technology and audio/video software

Course Objectives: Integration and implementation of skills and knowledge of audio and video editing, graphics, animation and special effects for creation of multimedia projects.

Course Outcomes: Students will develop skills for a realization of the creative multimedia projects, such as motion graphics, short videos with special effects and interactive presentations.

Course Content:

Theoretical instruction:

- 1. Elements of multimedia. Architecture of multimedia.
- 2. Processes of creating and designing multimedia. Phases of project.
- 3. Multimedia elements: video recording, editing and postproduction.
- 4. Multimedia elements: sound technical and design principles of using sound in multimedia.
- 5. Multimedia and television: advertising.
- 6. Multimedia elements: using and animating text in multimedia.
- 7. Motion graphics design
- 8. Images and colors in multimedia
- 9. Animation as part of multimedia
- 10. Interactivity
- 11. Exhibiting, archiving and distributing multimedia
- 12. Students' discussions and analysis of multimedia projects

Practical instruction (Problem solving sessions/Lab work/Practical training):

Practical training in Final Cut Studio applications as well as Adobe After Effects, for the creation of multimedia projects (video and audio editing, advanced techniques, special effects, title design, motion graphic design, interactive DVD production).

- 1. Edward L. Counts, Multimedia design and production, Pearson Education, 2004.
- 2. Ray Villalobos, Exploring Multimedia for Designers, Delmar Cengage Learning, 2008.
- 3. Erika Sadun, Digital video, SYBEX, San Francisco, 2003.
- 4. Ivo Blaha, Osnove dramaturgije zvuka u filmskom i TV delu, FDU i RTS, Beograd, 1993.
- 5. Jeff Johnson, Designing with mind in mind, 2010.

| Number of active lessons: 75 | | | Other classes: | |
|---|---------------|--------|-----------------|--------|
| Lectures: 30 | Exercises: 45 | Other: | Research study: | |
| Instruction methods: Lectures, Practical Training | | | | |
| Grading (maximum number of points: 100) | | | | |
| Preliminary activitie | es Points | | Final Exam | Points |
| Lectures activities | | | Written exam | 40 |
| Practical work | 30 | | Oral exam | |
| Colloquium(s) | 20 | | | |
| Seminar(s) | 10 | | | |

Study Program: AVT, NRT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Social Networks

Instructor(s): Slobodanka S. Đenić, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Gaining theoretical and practical knowledge related to th field of social networking networking and participatory web, the technologies that are still in development.

Course Outcomes: Students are trained to use modern technology that is related with social networks and participatory Web (for designing applications and user interfaces) and to participate in the further development of these technologies.

Course Content:

Theoretical instruction:

- 1. First introductory lecture (organization and content of the course). Basic concepts.
- 2. Previous development of WWW. Web 2.0 and Web 3.0.
- 3. Social networks. Concept, characteristics and types.
- 4. Social networks analysis.
- 5. Development of online communities and their further development. Motivation of users' participation.
- 6. Location aware social networks.
- 7. Social networking software.
- 8. Web 2.0 technologies. Interactive web: Ajax and APIs.
- 9. Web 2.0 technologies: P2P, Web services, SOA, RSS, REST, JSON, mashups.
- 10. The open source movement. Open Data. Open Content.
- 11. Discussion and socialization: Forums, Chat, IM. Publishing: blogs and Wikis, Wikipedia.
- 12. The exchange of digital content. Social tagging.
- 13. Recommendation systems, mechanisms for the development of trust and reputation in social networks.
- 14. Social information processing, navigation and search. concept of crowd sourcing.
- 15. Web based social games.

Practical instruction (Problem solving sessions/Lab work/Practical training):

In the laboratory: following the lectures. The practical application of technologies to create social networks and mashups.

- 1. R. Yee, Pro Web 2.0 Mashups Remixing Data and Web Services, Berkley, CA: Apress, 2008.
- 2. Participative Web And User-Created Content: Web 2.0 Wikis and Social Networking, OECD, 2007.
- 3. J. Porter, Designing for the Social Web, Berkley, CA: New Riders, 2008.
- 4. T. Segaran, Programming Collective Intelligence, Sebastopol, CA: O'Reilly Media, Inc, 2007.

| Number of active lessons: 75 | | | Other classes: | | | |
|------------------------------|---|------------------|-----------------|--------|--|--|
| Lectures: 30 | Exercises:30 | Other: 15 | Research study: | | | |
| Instruction method | Instruction methods: | | | | | |
| | Grading (maximum number of points: 100) | | | | | |
| Preliminary activiti | es Points | | Final Exam | Points | | |
| Lectures activities | | | Written exam | | | |
| Practical work | 10 | | Oral exam | | | |
| Colloquium(s) | 30 | | Practical exam | 30 | | |
| Seminar(s) | 30 | | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Digital Design of Publications

Instructor(s): Dragoljub Martinović, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Learning the elements of digital publishing and developing technical skills, that leads to successful creation of visual communication design.

Course Outcomes: Students will be able to digitally design different types of publications, combining appropriately visual elements and textual content.

Course Content:

Theoretical instruction:

- 1. Introduction to digital publishing. The basics of graphic design.
- 2. Form and content of graphic design: basic principles of composition.
- 3. Creative methodology, process of designing: planning, developing ideas
- 4. Typography
- 5. Illustration design
- 6. Integration of illustration and text
- 7. Book design: book structure, front, body and back matter
- 8. Book and magazine covers. Stylistic balance
- 9. Integration of the content and form
- 10. Design of advertisements, posters and billboards
- 11. Design of brochures and catalogues
- 12. Contemporary trends in digital publishing design

Practical instruction (Problem solving sessions/Lab work/Practical training):

Learning software for vector and raster graphics, combining vector and bitmap images, and their application in different publications (applications: Adobe Photoshop, Illustrator, InDesign).

- 1. Miroslav Fruht, Milan Rakić, Ivica Rakić, Grafički dizajn Kreacija za tržište, Zavod za udžbenike i nastavna sredstva, Beograd
- Bruno Michael H., Pocket Pal: The Handy Little Book of Graphic Arts Production, 19th Edition, Graphic Arts Technical Foundation, 2004.
- 3. Best of Brochure Design, Rockport, 2008.
- 4. Lee, Marshal, Bookmaking: Editing, Design, Production, Third Edition, W. W. Norton and Company, 2004.
- 5. Robert Birnghurst, The Element of Typographic Style, Hartley & Marks, 2002.

| Number of active lessons: 75 | | | Other classes: | |
|---|------------|------------------|-----------------|--------|
| Lectures: 45 | Exercises: | Other: 30 | Research study: | |
| Instruction methods: | | | | |
| Grading (maximum number of points: 100) | | | | |
| Preliminary activiti | es Points | | Final Exam | Points |
| Lectures activities | 10 | | Written exam | 40 |
| Practical work | 30 | | Oral exam | |
| Colloquium(s) | 20 | | | |
| Seminar(s) | | | | |

Study Program: AVT

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Professional Practice

Instructor(s): Jadranka Ajcevic

Course Status: Compulsory

Number of ECTS: 4

Prerequisites: none

Course Objectives: Connect the knowledge acquired in class to the requirements of practical tasks.

Course Outcomes: Training for work in institutions and training for public oral presentation.

Course Content:

Theoretical instruction:

Practical work is carried out in appropriate professional factories, companies and public institutions, and organizations to carry out innovation activities, as well as the organization to provide infrastructural support Innovations.

Term paper defines a specific topic or task to professional practice (making certain device or program development or project management, development of technical - technological documentation, etc.) Mandatory contribution to the proper presentation of the paper.

Other classes:

Textbooks and References: Number of active lessons: 75

Lectures: Exercises: Other: Research study:

Instruction methods: Lectures, problem solving sessions, laboratory exercises, consultations, colloquiums, knowledge tests, final exam.

| Grading (maximum number of points: 100) | | | | |
|---|--------|--------------|--------|--|
| Preliminary activities | Points | Final Exam | Points | |
| Lectures activities | | Written exam | | |
| Practical work | | Oral exam | | |
| Colloquium(s) | | | | |
| Seminar(s) | | | | |



Study Program: AVT, EPO, NET, NRT, RT, ELITE

Type and Level of Studies: Basic applied studies, First level of higher education

Course Title: Final Project

Instructor(s):

Course Status: Compulsory

Number of ECTS: 8

Prerequisites: Knowledge of computer operating system, file management.

Course Objectives: Students training for using standard application software and including in the digital society.

Course Outcomes: Students will understand the principles of the use of application software and know how to use programs for word processing, presentation and cross calculations, using a basic Internet service, and to combine the implementation of various programs.

Course Content:

The aim of the final project solution and / or analysis and presentation of practical problems, which proves that the candidate has acquired the intended level of professional competence and maturity in a particular field of technology.

The process of drafting and defense of the final work is determined by rules on the procedure for the preparation and defense of the final work. The student has the right to begin production of the final work when he stays up to three does not pass the certification exam. The student selects one of the subjects who passed the exam, and the subject teacher to mentor. Mentor defines a topic and a final paper assignments, after which the candidate applies subject.

The student needs to complete the final paper for at least three weeks and a maximum of six months from the date of the application threads.

During the final paper the student has the required consultation with the supervisor.

Final paper should have a volume of 20 to 40 A4 pages, excluding annexes. The essential accessory is the final paper and presentation of final work on a recommended maximum of 20 films (slides). Technical processing of content and quality of the final paper should be in accordance with instructions for making the final technical work that is an integral part of the Regulations on the procedure for the preparation and defense of the final work.

Mentor with his signature on each copy of the final paper confirms the satisfactory quality of content and technical processing. When you finish making the work, the student submits more scientific and educational application for approval of the final thesis defense, and the application submitted four copies of the final paper. Each copy of the final paper should be attached that contains the entire text of the final paper in electronic form.

Teaching - Academic Council determines the Commission for a public oral defense of the final paper, which consists of, president, mentor and at least one member from among the teachers VIŠER. The Commission may have additional members from among the teachers of higher education institutions or other prominent experts in the field dealt with the final paper.

Final thesis is defended orally before the Commission; student prepares a short presentation (15 minutes), which presents the basic assumptions of the problem and characteristics of the solution, then the panel can ask questions and evaluate the work as a whole.

| Number of active lessons: 75 | Other classes: | | | | |
|--|----------------|--|--|--|--|
| Lectures: Exercises: Other: Research | study: | | | | |
| Instruction methods: Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam. | | | | | |
| Grading (maximum number of points: 100) | | | | | |
| Preliminary activities Points Final Exam | Points | | | | |
| Lectures activities Written exam | | | | | |
| Practical work Oral exam | | | | | |
| Colloquium(s) | | | | | |
| Seminar(s) | | | | | |







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School of Electrical Engineering and Computer Science Vojvode Stepe 283, Belgrade / Serbia

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