The Study Program of Audio and Video Technologies

The first publication of TEMPUS project
Innovation and Implementation of the Curriculum Vocational Studies in the Field of Digital Television and Multimedia
Project No. 517022-TEMPUS-1-2011-1-RS-TEMPUS-JPCR

School of Electrical and Computer Engineering of Applied Studies
Preface

General View at Audio and Video Technologies Study Program
  - Program Concepts
  - The Program’s Main Goals
  - Outcomes
  - Organizational Structure
  - Class Structure
  - Technological Infrastructure
  - Student Productions

AVT Study Program Curriculum

AVT Study Program Syllabus

This publication is aiming to present current state of educational process in the field of audio and video as a first step in this TEMPUS project problem identification. VISER implements the study program for audio and video technology for last ten years. This program also contains courses for teaching TV and multimedia subjects. Therefore it will serve as a base for the signed TEMPUS project development.

The main features of VISER 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 three 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 studied programs, that all together exists within a building with over 4000 square meters, over 1000 sitting places and 25 different laboratories. More than hundred teaching stuff work with the students divided in small groups. The VISER teachers try to apply the educational rule the student to be in focus. They practice the new educational technologies. There is a positive experience in e – learning. Thanks to its human and infrastructure resources VISER is the local leader in ICT educational field and tends to become the leader in a broader region.
General View at Audio and Video Technologies Study Program

The Department of Audio and TV Technologies was formed at the Advanced School of Electrical Engineering School during the 2000-2001 academic year, thus recognizing the great need and desire for such studies at an applied studies institution heretofore unheard of within this region. The main point of these studies was to train future applied technicians ready to meet any and all challenges their profession would call for within the fields of audio and video.

In 2004-2005, the department changes its official title to Audio and Video Technologies, thus encompassing the ever-growing fields and demands falling under the umbrella of applied television practices. In 2007, in accordance with Higher Education legislative changes within Serbia, the course received official accreditation as one of a total of seven programs existing within the School of Electrical and Computer Engineering of Applied Studies.
Program Concepts

The Audio and Video Technologies study program revolves around three main premises:

1. Unifying knowledge
2. Convergence of technologies and arts
3. Flexibility in application

The first premise is a result of a strategic decision centered around the idea that today's engineers and technicians, with various degrees of experience, must be afforded the chance to gain knowledge in all areas of multimedia studies. Keeping a keen eye on current market trends, it became obvious that a division of audio and visual studies into two separate, independent, fields creates a niche of specialists who are, in the end, unable to accommodate all the requirements required by constantly changing markets.

The second premise is based upon the fact that a student’s education is primarily focused on a technical/engineering approach to given problems, but at the same time, is based on the idea of an inherent convergence
of technology and the arts. Recognizing these facts makes this program unique and novel within Serbia, where attitudes of a strict and clear division between science and the arts are ever present. It is precisely because of this that more and more students, whose main background is within the arts, are applying to this program, along with their colleagues from technical fields.

The third premise upon which the program is based upon relies heavily on the idea of flexibility, wherein there is a constant and running analysis of all the necessary parameters needed for its continued development and operation. To that end, the Audio and Visual Technologies program presents an open system, ready to, at any and every moment, adapt to observed changes and needs.

As a testament to the program’s success, as well as its novel approach in developing new trends in conceptualizing educational curriculums, there is a marked upward trend in the number of enrolments as well as a positive rate of employment amongst graduates within their chosen field of study.
The Program’s Main Goals

The Audio and Visual Technologies curriculum has two main goals:

1. Schooling students in realistic, clearly definable professional areas of sound and image production, for which there is a growing demand both within local and surrounding markets.

2. Supplying the technical and personnel prerequisites for educating students in the domains of both theoretical, as well as applied knowledge necessary for working within the highly specialized software and hardware environments present in the everyday application of sound and video technologies.

Meeting the first goal can only be achieved by a constant and vigilant evaluation of current market parameters, as well as a constant assessment of emerging trends of expertise within the audio and visual domains.

To that end, the school maintains continued contacts with professionals within the field, executives and lead engineers of some of the largest
TV and radio stations, marketing agencies, cultural institutions, etc. In this manner, coupled with the curriculum’s standard of flexibility, the program can constantly adapt to the realities of the market, which in turn results in our graduates’ high degree of successful employment. Some of the professions for which this program prepares its students are:

**Audio:** sound engineer for TV and Radio, sound designer for movies, postproduction audio supervisor, sound engineer for theater and stage, multimedia audio engineer, acoustic interiors engineer, acoustic and sound proofing engineers, personnel monitoring/responsible for sound control in urban areas.

**Video:** director of photography/cameraman, editor, graphics/effects designer, image designer – assistant cameraman, audio/visual assistant, multimedia networking administrator.

**Graphics and Animation:** graphics design, animation, 2D and 3D computer animator, videographer, multimedia designer, and web designer.

The second goal is met by continually following developing trends in the fields of audio and video, constantly upgrading and complementing technological resources and infrastructure, as well as a strategic selection and continued education of the teaching staff.
Outcomes

On the basis of the aforementioned concepts and, the expected goals of this course of study are to enable students to:

- complete audio and video production/post-production jobs, as well as applied knowledge of the newest 2-D and 3-D computer animation technologies;
- synergize various techniques used in the audio and visual technologies fields;
- continually expand their knowledge base using all available literature and specialized education courses;
- have a critical and self-reflective viewpoint in their approach and analysis of given tasks, as well as their ability to recognize their own strengths and weaknesses as well as those of their completion;
- have a developed set of professional ethics geared towards long-term success;
- be able to work in a multi-cultural environment, with progressive work concepts applicable to varying requests;
- develop communication skills, as well as an understanding of social relationships and procedures throughout the world.
The main organizational structure of the program is divided amongst three main groups of courses:

1. Courses covering the field of audio
2. Courses covering the field of video
3. Course covering the field of computer graphics and animation

The curriculum covers a three year period, and is in accordance with all standards as set out by the Bologna Declaration. All courses are uniformly divided semestrally, each carrying a previously defined number of ECTS points.

With the ability to choose their given subject/course of study, students are given the opportunity to tailor their education to their own interests. The system of choosing a course of study is, however, so designed as to ensure that every student has at least a basic working knowledge of all relevant fields covered by the program in its entirety, and so ensures the established necessity for converging variant fields of knowledge.

All courses have 30 theoretical classes, and 45 classes of applied knowledge, and are worth 6 ECTS points, while the final thesis implies the completion of a total of 150 applied techniques classes, and is worth 12 ECTS points.

Given the need for defining a necessary basic education, the program also consists of a number of mandatory courses. These include:

1. Mathematics in Engineering
2. Electrical Engineering
3. Electroacoustics
4. Fundamentals of TV
5. Digital processing of audio and video signals  
6. Electronics  
7. Professional Practice  
8. Final Project  

All other courses are elective, and in accordance with their general subject division, they are:

**Audio**
1. Fundamentals of Audio Engineering  
2. MIDI and Sound Synthesis  
3. Room Acoustics  
4. Recording Studio Equipment  
5. Musical Instruments  
6. Sound recording  
7. Sound Systems Engineering  
8. Sound Design  
9. Music Production  
10. Music Postproduction

**Video**
1. Image Recording  
2. TV systems and Video Technologies  
3. Digital Image Processing  
4. TV Cameras  
5. Video Production  
6. TV Production  
7. Multimedia Signal Distribution  
8. Digital TV  
9. Electrical Installations and Lighting
In view of completing and expanding a student’s general knowledge base, the program also offers a variety of social science courses.

**Social science courses**

1. Mass Media  
2. Communicology  
3. Fundamentals of Management  
4. Media and Marketing

The organizational structure inherent in managing a complex curriculum such as this consists of the following:

1. Course manager and Course managing board  
2. Audio Managing Board  
3. Video Managing Board  
4. Computer Animation Managing Board  
5. Programming support

All teaching staff and assistants engaged in a particular field of study complement the roles and responsibilities of each board. Each board has their own manager, responsible for the overall course of teaching within
their respective field, as well as the general operation, maintenance, and development of educational and technological resources. Managers of each board participate in Course Managing Board, headed by Course Manager. Each course manager is also a academic council member, represents the interests of that field of study in general discussions, and is responsible for the course’s overall performance.

Programming support is a body responsible for forming, guiding and media presentation of students’ productions. The organizational segment is a necessary by product of the fact that as a result of everyday curricular and extracurricular activates there is a vast number of concrete production projects which, when well planned and executed, create an easily identifiable and attractive body of student production encapsulating the entire Audio and Video Technologies program.
Class Structure

The Audio and Video Technologies program pays particular attention to teaching methods. The specific organization of class structure stems from the various needs incorporated into its execution. The basic classroom environments present are:

1. Lecture hall/large auditorium classes
2. Smaller group workshops
3. Individual instruction

Lecture hall classes are primarily designed for theoretical knowledge and oratory, at which all students who chose the course are present. Studio classes are conducted in smaller groups, while training on specialized hardware and software tools is conducted under the principle of one student - one workplace, wherein the need for individual instruction comes to fore.

As a unique form of the teaching process, exceptional students are included in both curriculum-based and extracurricular studio time, as well
as in cooperative classes with younger students. In this manner, the best students are afforded extra opportunities for hands-on work, which in turn motivates them for further success. Moreover, this extracurricular aspect affords students the opportunities to immediately find employment, either within the school itself, or any of the various institutions the school interacts with.

The specificity of this teaching process, reflected in its own high degree of diversity and individualization, requires that the teaching staff be ever alert and familiar with the latest trends in teaching methodologies. For exactly this reason, along with the highly specific and professional work completed, there is a degree of dedication and innovation required in the field of teaching methodology.
The Audio and Video Technologies program has at its disposal a number of technological resources. For the purposes of regular course-work, the students are presented with the following resources:

1. Recording studio
2. TV studio
3. Animation studio
4. Multimedia lab

From the onset, the design of these studio facilities required uncompromising quality, both in terms of exterior design characteristics as well as the equipment housed within. At the core of this standard towards the planning, design, and realization of studio resources, lies the philosophy that it is hardly promising to expect that students be able to aptly apply first rate knowledge and skills in future ventures, if not afforded the same standard while learning. Therefore, without investing in the highest quality teaching tools, one cannot expect the highest quality result of the teaching process.
The recording studio is completely based on the ProTools platform: HD3 system with C24 controller. Software trainings are held in the multimedia lab, equipped with 21 I-Mac computers, with Digidesign M-Box2 audio interface. All the spaces in which these types of classes are held are entirely acoustically furbished and designed according to the highest standards.
prescribed. The recording studio also houses labs for sound recording, radio editing, and audio production.

The TV studio is comprised of a production control room, a studio floor, and editing suite. TV studio itself is the target goal of this TEMPUS project, and as such, will be technologically and spatially improved to the latest digital TV standards.

The animation studio, apart from the editorial and drawing areas, avails itself of the latest computer resources, both in terms of hardware and software. Classes are conducted using Maya software, while practically all the schools’ existing computer resources (at this moment, over 200 networked machines) can be made available for the rendering purposes of demanding 3D animation projects.

The entire SP program is based on the use of Macintosh computers, networked into one large entity. The SP AVT multimedia lab is equipped with 21 I-Mac computers, video and surround sound audio systems.
The daily teaching process, which entails regular classes, project development, and final thesis work, invariably results in a large number of finished productions from all fields of study within the program.

The Audio and Video Technologies program maintains constant associations with leading artists from both the region and abroad, whose visions and projects the students, through regular course work, assignments, workshops and seminars, put into realization.

In this way, the program is constantly growing and expanding, while at the same time, technical/artistic relationships are formed which transcend school bounds. SP AVT has to date collaborated with over 300 musicians (both soloists as well as bands), and has produced several dozen TV shows and animated movies, some of which have received prestigious awards at festivals both locally and abroad.

All this creates a large base upon which to form student productions of the Audio and Video Technologies program, which is directed and guided by a dedicated program committee. These productions have become a locally recognizable brand, and have their place within the media environment as well as among various collaborative projects between various cultural, media and educational institutions, music and film festivals, etc. The program has cooperated in the production of, and been awarded, several social projects.
STUDENT PRODUCTIONS

(“Music As Creative Capital of Serbia”, “The Application of New Technologies in Live Music Performance”, “The New Serbian Music Scene”, etc.), which have directly influenced and heightened the quality of artists’ works, the overall quality of the teaching process, and the school’s overall media presentation.

Continual cooperation with various artists and experts in the field of audio and video technologies have resulted in a great number of seminars and workshops, organized each semester, which guarantee a continued dedication and quality infused into the teaching process of the Audio and Video Technologies program.
# AVT Study Program Curriculum

## 1st Year

<table>
<thead>
<tr>
<th>No.</th>
<th>COURSE TITLE</th>
<th>Year</th>
<th>Sem.</th>
<th>Lect.</th>
<th>Pract.</th>
<th>Lab.</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Mathematics in Engineering</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Application Software</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3.</td>
<td>English Language</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>Electrical Engineering</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>Electroacoustics</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>6.</td>
<td>Digital Multimedia 1</td>
<td>1</td>
<td>1</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>Mass Media</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>8.</td>
<td>Fundamentals of TV</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>9.</td>
<td>Computer Graphics</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>10.</td>
<td>Digital processing of Audio and Video Signals</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>11.</td>
<td>Fundamentals of Audio Engineering</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>12.</td>
<td>Electronics</td>
<td>1</td>
<td>2</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
</tbody>
</table>

## 2nd Year

<table>
<thead>
<tr>
<th>No.</th>
<th>COURSE TITLE</th>
<th>Year</th>
<th>Sem.</th>
<th>Lect.</th>
<th>Pract.</th>
<th>Lab.</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>MIDI and Sound Synthesis</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Image Recording</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>3.</td>
<td>TV Systems and Video Technologies</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>Animation Basics</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>Recording Studios Equipment</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>6.</td>
<td>Room Acoustics</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>Desktop Publishing Design</td>
<td>2</td>
<td>3</td>
<td>2</td>
<td>0</td>
<td>3</td>
<td>6</td>
</tr>
<tr>
<td>8.</td>
<td>Musical Instruments</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>9.</td>
<td>Computer Animation 1</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>10.</td>
<td>Image Processing</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>11.</td>
<td>TV Cameras</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>12.</td>
<td>Digital TV</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>13.</td>
<td>Sound Recording</td>
<td>2</td>
<td>4</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>14.</td>
<td>Communicology</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
</tbody>
</table>
## 3rd Year

<table>
<thead>
<tr>
<th>No.</th>
<th>COURSE TITLE</th>
<th>Year</th>
<th>Sem.</th>
<th>Lect.</th>
<th>Pract.</th>
<th>Lab.</th>
<th>ECTS</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Professional Practice</td>
<td>3</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td>6</td>
</tr>
<tr>
<td>2.</td>
<td>Video Production</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>3.</td>
<td>Sound Design</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>4.</td>
<td>TV production</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>5.</td>
<td>Fundamentals of Management</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>3</td>
<td>0</td>
<td>6</td>
</tr>
<tr>
<td>6.</td>
<td>Music Production</td>
<td>3</td>
<td>5</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>7.</td>
<td>Computer Animation 2</td>
<td>3</td>
<td>5</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>8.</td>
<td>Multimedia Signal Distribution</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>9.</td>
<td>Multimedia Production</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>10.</td>
<td>Electrical Installations and Lighting</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>2</td>
<td>1</td>
<td>6</td>
</tr>
<tr>
<td>11.</td>
<td>Media and Marketing</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>12.</td>
<td>Sound Systems Engineering</td>
<td>3</td>
<td>6</td>
<td>2</td>
<td>1</td>
<td>2</td>
<td>6</td>
</tr>
<tr>
<td>13.</td>
<td>Music Postproduction</td>
<td>3</td>
<td>6</td>
<td>1</td>
<td>0</td>
<td>4</td>
<td>6</td>
</tr>
<tr>
<td>14.</td>
<td>Final Project</td>
<td>3</td>
<td>6</td>
<td></td>
<td></td>
<td></td>
<td>12</td>
</tr>
</tbody>
</table>
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. Real and complex numbers.
2. The concept of matrix characteristics and operations.
3. The concept of determinants and characteristics. Methods for calculation.
6. Functions: definition, basic properties, limit value, continuity, and asymptotes.
7. Derivative of functions.
10. Indefinite integrals.
11. Definite integrals.
12. Use of integrals.

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.

Textbooks and References:

Number of active lessons: 75

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

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>0</td>
</tr>
<tr>
<td>Practical work</td>
<td>10</td>
<td>Oral exam</td>
<td>29</td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>51</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**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):** Professor Radmila Vukic, PhD  
**Course Status:** Elective  
**Number of ECTS:** 6  
**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:**  
**Theoretical instruction:**  
1. 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.  
10. Functions, basic application techniques.  
12. Presentations. Basic rules to create and display presentations, making slide.  
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.

**Textbooks and References:**  
2. ECDL literature- Modules 3,4,6 and 7  
3. Online preparation: www.ecdltest.rs

**Number of active lessons:** 75  
**Instruction methods:** Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>40</td>
</tr>
<tr>
<td>Practical work</td>
<td></td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Grading (maximum number of points: 100)**
**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
10. World processing. Databases and spreadsheets
11. Graphics and multimedia. Indirect speech
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:**
3. Different English language grammars, journals, Internet texts etc.

**Number of active lessons:** 75

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>10</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>60</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Other classes:**
- Lectures: 2
- Exercises: 2
- Other: 1
- Research study: 1
### Study Program: AVT

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

**Course Title:** Electrical Engineering

**Instructor(s):** Jadranka Ajcevic

**Course Status:** Compulsory

**Number of ECTS:** 6

**Prerequisites:** Knowledge of computer operating system, file management.

**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 alternating 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.
3. Electrical networks with a time constant currents  
   - Electric current, electric circuits, resistance, resistors and conductors.
4. Electrical networks with a time constant currents  
   - Electrical work and power, sources of electric current; Kirchhoff’s laws.
5. 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
10. Electrical networks with alternating currents  
   - Electrical network with alternating currents, R (resistive) elements (serial and parallel connection of resistors)
11. Electrical networks with alternating currents  
   - L (inductive) and C (capacitive) elements (serial and parallel connection); power and power factor
12. Electrical networks with alternating currents  
   - Basic notions during the change of the working regime in electrical networks
13. Electrical networks with alternating currents  
   - Solving electrical networks;

#### Practical instruction (Problem solving sessions/Lab work/Practical training):
- Introduction to the software package Electronics Workbench (EWB).  
- The basic elements, the sources of power supply, indicators and instruments in EWB.  
- Ohm's law.  
- Kirchhoff's laws.  
- Thévenin's theorem.  
- Resistor in the circuit of alternating current (AC circuit).  
- Capacitor in AC circuit.  
- Electromagnetic coil in AC circuit.  
- Serial RLC circuit.  
- Parallel RLC circuit.

**Textbooks and References:**

**Number of active lessons:** 75  
**Other classes:**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Exercises</th>
<th>Other</th>
<th>Research study</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>35</td>
</tr>
<tr>
<td>Practical work</td>
<td>20</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program:** AVT  
**Type and Level of Studies:** Basic applied studies, First level of higher education  
**Course Title:** Electroacoustics  
**Instructor(s):** Professor Radmila Vukic, 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.  
3. The intensity of sound. Simple and complex sound. At the same time several radiation sources. Sound attenuation.  
5. Basic terms of physiological acoustics. Sense of hearing. Outer, middle and inner ear.  
6. A sense of sound intensity and height. The sound intensity and height and timbre. Audible area of the ear. Decibels, fons and sones.  
9. The intensity of sound in the room. Sound absorbers. The geometric shape of the room.  
10. Analogy.  
11. The basic terms of electroacoustics. Microphones.  

*Practical instruction (Problem solving sessions/Lab work/Practical training):*  
Measuring sensitivity of the ear.  
Measurement of the threshold of audibility.  
Examination of the distribution of sound pressure in the room.  
Measurement of the reverberation time.

**Textbooks and References:**  

**Number of active lessons:** 75  

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Exercises</th>
<th>Other</th>
<th>Research study</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>2</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

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

**Grading (maximum number of points: 100)**  

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>40</td>
</tr>
<tr>
<td>Practical work</td>
<td>10</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program: AVT, NRT, RT**

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

**Course Title:** Digital multimedia 1

**Instructor(s):** Professor Radmila Vukic, PhD

**Course Status:** Elective

**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. Acquiring skills to work with scanners, digital cameras and compact discs.

**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. Mathematical and technological basis of digital multimedia. The program includes: a digital representation of multimedia, the hardware, standards, social and ethical issues, and application.
2. Basics of computer graphics. Program includes: basic class graphics, vector graphics and bitmap graphics.
3. Vector graphics. The program includes: forms, transformations and filters, 3-D graphics.
4. Bitmap graphics. The program includes: resolution, compression, and editing, geometric transformation.
5. Color. The program includes: the scientific basis of color, RGB color model, the channels and methods of color correction.
6. Fonts. The program includes: the text as a graphic element, the list of code text symbols, fonts, and digital fonts.
7. Fracture or layout electronic multimedia documents. The program includes: a markup language, layout using HTML and CSS, mobile or portable multimedia documents and basic navigation.

*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. The practical part includes a short training for the use of devices such as scanners and digital camera.

**Textbooks and References:**

**Number of active lessons:** 75

<table>
<thead>
<tr>
<th>Lectures:</th>
<th>Exercises:</th>
<th>Other:</th>
<th>Research study:</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>40</td>
</tr>
<tr>
<td>Practical work</td>
<td>10</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>40</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program:** AVT  
**Type and Level of Studies:** Basic applied studies, First level of higher education  
**Course Title:** Mass Media  
**Instructor(s):** Professor Miroslav Lutovac, PhD  
**Course Status:** Elective  
**Number of ECTS:** 6  
**Prerequisites:** none  
**Course Objectives:** Getting familiar with the media of mass communication.  
**Course Outcomes:** Acquiring knowledge required for working in media, public appearances and media presentations.  
**Course Content:**  
- What is media? The history of media, theoretical basis and the relation with the media culture. Media culture, market, politics, ideology.  
- Television – symbol of the media power. History, technology, genres. Social and psychological aspects and their influence on the shaping of individual and collective awareness. The relation with the other media.  
**Textbooks and References:**  
**Number of active lessons:** 75  
**Instruction methods:** Lectures, problem solving sessions, laboratory exercises, assignments, consultations, colloquiums, knowledge tests, final exam.  
**Grading (maximum number of points: 100)**  
<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>Written exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical work</td>
<td>Oral exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Study Program: AVT, NRT, RT
### Type and Level of Studies: Basic applied studies, First level of higher education
### Course Title: Fundamentals of TV
### Instructor(s): Professor Mile Petrovic, PhD
### Course Status: Elective
### Number of ECTS: 6
### Prerequisites: none

#### Course Objectives:
Acquisition of basic knowledge of audio and video signals, the television standards and principles of operation of television systems.

#### Course Outcomes:
Training for the use of television and telecommunication equipment for processing and transmission of picture and sound.

#### Course Content:
**Theoretical instruction:**
1. The principles of TV picture transmission and reception.
2. PAL, SECAM and NTCS systems.
3. TV picture analysis and synthesis.
4. CCD and tube imaging sensors.
7. Analog and digital video signals. Connecting the video equipment in the TV system.
10. Audio and video signals compression. JPEG, MPEG2, MPEG4 and MPEG7.
12. High definition television (HDTV).

**Practical instruction (Problem solving sessions/Lab work/Practical training):**
Exercise:
1. Measurement equipment and test signals.
2. The function and role of individual devices inside of a TV system.
3. Connectors and cables of the TV system.
4. Conversion of the light magnitudes in electric signals.
5. Analog video signals.
6. Image source synchronization.
7. Impact of changes in the level of video signal and its frequency characteristics on the quality of reproduced TV images.
8. Measuring the level of reception signal in terrestrial and satellite TV diffusion.

#### Textbooks and References:
1. M. Petrovic — lectures in the form of PowerPoint presentations;

#### Number of active lessons: 75

<table>
<thead>
<tr>
<th>Lectures: 2</th>
<th>Exercises: 1</th>
<th>Other: 2</th>
<th>Research study:</th>
</tr>
</thead>
</table>

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

#### Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>5</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>20</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**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:*
2. Graphics Hardware,
3. Output – Only Technology,
4. Input Technology,
5. Interaction and Logical Devices.
6. Fundamentals of Interactive Graphics Programming,
11. Scan-Converting Polygons.
14. Graphical User Interfaces (GUI).

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


**Textbooks and References:**

**Number of active lessons:** 75

**Instruction methods:** Lectures, laboratory exercises, consultations, colloquiums, knowledge tests, final exam.

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>5</td>
<td>Written exam</td>
<td>50</td>
</tr>
<tr>
<td>Practical work</td>
<td>25</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Other classes:**

Lectures: 2  Exercises: 1  Other: 2  Research study: 2
Study Program: AVT, ELITE

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

Course Title: Digital processing of audio and video signals

Instructor(s): Professor Radmila Vukic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: Knowledge of computer operating system, file management.

Course Objectives: Working in the field of Digital Signal Analysis and Processing it is important to know basic aspects of Signals and digital signal processing as well. Basic concepts of DSP are well known and are involved in different audio and video equipment, machines, devices, gadgets, etc.

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

Course Content:

Theoretical instruction:
1. DSP basic course.
2. DSP technology.
3. DSP concepts.
4. DSP algorithms.
5. DSP audio and video applications.
6. DSP equipment and devices.

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

Textbooks and References:
5. TI. Basic DSP Course.

Number of active lessons: 75

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

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>70</td>
</tr>
<tr>
<td>Practical work</td>
<td>30</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Program: AVT

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

Course Title: Fundamentals of Audio Engineering

Instructor(s): Dragan Drincic

Course Status: Compulsory

Number of ECTS: 6

Prerequisites: Basics of Electroacoustics, Basics of Audio Technics

Course Objectives: To give the student the knowledge of concepts and principles concerning audio technics.

Course Outcomes: To be able to understand and implement solutions and rules in the field of audio technics.

Course Content:

Theoretical instruction:
1. Introduction to Audio Technics
2. Human sense of hearing as a receiver.
3. Audio signals
4. Audio systems.
5. Acoustical environment
6. Microphone concept
7. Space dimension of stereo sound image
8. Basics of audio equipment.
9. Sound recorders
10. Sound processors
11. Audio equipment connections
12. Audio equipment powering.
13. Basic concept of audio mixers design – part 1
14. Basic concept of audio mixers design – part 2
15. Basic concept of audio mixers design – part 3

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

Textbooks and References:

Number of active lessons: 75

Other classes:
Lectures: 2  Exercises: 1  Other: 2  Research study:

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

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>40</td>
</tr>
<tr>
<td>Practical work</td>
<td>20</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
## STUDY PROGRAM SYLLABUS

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

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

**Course Title:** Electronics

**Instructor(s):** Professor Radmila Vukic, 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:**
1. 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.
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).
10. Operational amplifier: basic circuits with operational amplifiers.
12. Logic circuits: operation principles and basic characteristics.
13. Basic combinational and sequential circuits.

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

### Textbooks and References:

### Number of active lessons: 75

### Other classes:

<table>
<thead>
<tr>
<th>Lectures: 2</th>
<th>Exercises: 2</th>
<th>Other: 1</th>
<th>Research study:</th>
</tr>
</thead>
</table>

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

### Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>60</td>
</tr>
<tr>
<td>Practical work</td>
<td>10</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program:** AVT  
**Type and Level of Studies:** Basic applied studies, First level of higher education  
**Course Title:** MIDI and Sound Synthesis  
**Instructor(s):** Professor Ljiljana Stanimirovic, 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:*  
3. Digital devices: sequencers, samplers, etc.  
4. Synchronization problems.  
5. Controls.  
6. Complex systems.  

*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:**  

**Number of active lessons:** 75  
**Other classes:**  
- Lectures: 2  
- Exercises: 0  
- Other: 3  
- Research study:  

**Instruction methods:** Lectures, laboratory exercises, consultations, colloquiums, final exam.  

**Grading (maximum number of points: 100)**  

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>70</td>
</tr>
<tr>
<td>Practical work</td>
<td>30</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Study Program: AVT

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

**Course Title:** Image Recording

**Instructor(s):** Jadranka Ajcevic

**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. Contraction of a digital photo camera
2. Characteristics of a digital photo camera: lens construction, types of lenses
3. Aperture and shutter speed. Depth of field. Exposure value
4. Correct exposure in digital photography: problems with exposure, EV and lens corrections
5. Composition in photography
6. Architecture and landscape photography: problems of perspective distortion
7. Dynamic range and tonal quality in digital photography
8. Sensor construction in digital photo cameras
9. Sensor sensitivity and the problem of ‘noise’ in digital photography
10. Position of light in photography
11. Temperature of light sources
12. Portrait in photography
13. Digital images formats, RAW format
14. HDR digital image

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

- Recording and editing the digital images: recording in different light environments; exposure correction; tonal corrections; layer adjustments; image adjustments; levels and curves; chromatic aberration correction; sharpness correction; working in different color modes, color correction in Lab mode; digital montage and composition; working with color channels; creating masks; developing RAW files; creating HDR images.

### Textbooks and References:


### Number of active lessons: 75

### Other classes:

- Lectures: 2
- Exercises: 0
- Other: 3
- Research study: 3

### Instruction methods:

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

### Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td></td>
</tr>
<tr>
<td>Practical work</td>
<td>10</td>
<td>Oral exam</td>
<td>30</td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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): Professor Mile Petrovic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: Knowledge of basic concepts of television picture.

Course Objectives: Introduction to the systems, devices and technologies used in the production and transmission of TV programs.

Course Outcomes: At the end of this course, students will know the organization and functioning of the TV system, place and tasks for the engineers in the chain of processing video signals, as well as the use of modern advanced tools for image processing.

Course Content:

Theoretical instruction:

Practical instruction (Problem solving sessions/Lab work/Practical training):
Practice is consistent with lectures and aims to, through controlled independent work, bring the students into the matter and to help them master the material taught. Following software packages are used: Photoshop, Digital Image pro, Virtual Dub and Adobe Premiere Pro.

Textbooks and References:
2. M. Petrovic – lectures in the form of PowerPoint presentations;

Number of active lessons: 75

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

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>5</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>20</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program:** AVT  
**Type and Level of Studies:** Basic applied studies, First level of higher education  
**Course Title:** Animation Basics  
**Instructor(s):** Aleksandar Kajevic  
**Course Status:** Elective  
**Number of ECTS:** 6  
**Prerequisites:** none  

**Course Objectives:** Mastering basic and practical knowledge in area of 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 Premiere.

**Course Content:**

**Theoretical instruction:**
1. Introduction, retinal persistence, terms, terminology, technology historical overview and development of classical film animation.  
2. 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  
5. Condition of media, basic color mods (RGB, HSV, CMYK), input/output video devices. Object transformation (translation, rotation and scaling)  
6. 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  
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  
14. 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):**
1. Drawing practice, reducing characters to primary, individual drawings, practice of stop-frame animation  
2. Group practice of making animated forms, phonogram making and vocalization  
3. Making animated forms by using different computer programs  
4. Picture and audio editing of animated film

**Textbooks and References:**
1. Dovinković, Mala škola crtanog filma, Zagreb 1983.  

**Number of active lessons:** 75  
**Other classes:**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Exercises</th>
<th>Other</th>
<th>Research study</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>1</td>
<td>2</td>
<td></td>
</tr>
</tbody>
</table>

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>60</td>
</tr>
<tr>
<td>Practical work</td>
<td>25</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**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  
**Number of ECTS:** 6  
**Prerequisites:** Basics of Electroacoustics, 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. Audio mixers: analogue and digital.  
3. Audio signal flow.  
4. Sound recorders and players  
5. Audio signal processing equipment.  
6. Artificial reverberation equipment.  
7. Digital audio equipment  
8. Audio monitoring and metering.  
9. Basic components of audio equipment: preamplifiers, amplifiers  
10. Basic components of audio equipment: filters, transformers, attenuators, power suppliers  
11. Audio equipment connections and adjustment.  
13. Audio cables and connectors  
14. Basic principles of audio equipment design  
15. Basic audio.  

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

**Textbooks and References:**  

**Number of active lessons:** 75  

<table>
<thead>
<tr>
<th>Lectures: 2</th>
<th>Exercises: 1</th>
<th>Other: 2</th>
<th>Research study:</th>
</tr>
</thead>
</table>

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

**Grading (maximum number of points: 100)**  

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>40</td>
</tr>
<tr>
<td>Practical work</td>
<td>20</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**STUDY PROGRAM SYLLABUS**

<table>
<thead>
<tr>
<th>Study Program:</th>
<th>AVT</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type and Level of Studies:</strong></td>
<td>Basic applied studies, First level of higher education</td>
</tr>
<tr>
<td><strong>Course Title:</strong></td>
<td>Room Acoustics</td>
</tr>
<tr>
<td><strong>Instructor(s):</strong></td>
<td>Dragan Drincic</td>
</tr>
<tr>
<td><strong>Course Status:</strong></td>
<td>Elective</td>
</tr>
<tr>
<td><strong>Number of ECTS:</strong></td>
<td>6</td>
</tr>
<tr>
<td><strong>Prerequisites:</strong></td>
<td>Basics of Electroacoustics, Basics of Audio Technics</td>
</tr>
<tr>
<td><strong>Course Objectives:</strong></td>
<td>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.</td>
</tr>
<tr>
<td><strong>Course Outcomes:</strong></td>
<td>To be able to solve problems and implement solutions and rules concerning acoustical properties of buildings, building elements and materials, noise prevention and abatement</td>
</tr>
<tr>
<td><strong>Course Content:</strong></td>
<td></td>
</tr>
</tbody>
</table>
*Theoretical instruction:*  
1. Basic definitions and terms  
2. Sound propagation accompanying phenomena  
3. Sound field in closed spaces  
4. Acoustical elements (reflectors, absorbers, and diffusers)  
5. Sound transmission through partitions and facade elements  
6. Classification and description of noise (Standards, laws and regulations)  
7. Room acoustical classification with basic quality criteria  
8. Design of rooms for speech  
9. Design of rooms for speech  
10. Design of rooms for music.  
11. Principles for auditoria design  
12. Recording studio design  
13. Control rooms design  
14. Acoustics of worship spaces  
15. Room acoustics measurements.  

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

| Textbooks and References: |  
| **Number of active lessons:** | 75 |
| **Other classes:** |  
Lectures: 2 | Exercises: 1 | Other: 2 | 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:** Desktop Publishing Design  
**Instructor(s):** Professor Dragoljub Martinovic, PhD  
**Course Status:** Elective  
**Number of ECTS:** 6  
**Prerequisites:** none

**Course Objectives:** Students will learn different digital technologies and tools for designing printed media works.

**Course Outcomes:** Students will develop skills in print technology as well as artistic design and layout aesthetics, and will be able to create printed materials.

**Course Content:**

*Theoretical instruction:*
1. Introduction to print media. History and development of printing  
2. Print technologies and methods (offset and digital)  
3. Paper: types of paper and choices for printing  
4. Typography  
5. Book design: book structure, front, body and back matter, binding  
6. Illustration design: integration of illustration and text  
7. Book and magazine covers  
8. Integration of the content and form of the book design  
9. Newspaper design: types, formats, page spreads  
10. Magazines: types, formats, styles  
11. Design of other printed publications: advertisements and brochures  
12. Design of other printed publications: catalogues  
13. Visual identity: company name, logo, business card  
14. Finalization of the print process  
15. Contemporary print technologies and trends in print design

*Practical instruction (Problem solving sessions/Lab work/Practical training):*
1. Page spread - text and illustration layout design  
2. Design and digital layout of a catalogue, up to 10 pages

**Textbooks and References:**

**Number of active lessons:** 75  
**Other classes:**

<table>
<thead>
<tr>
<th>Lectures</th>
<th>Exercises</th>
<th>Other</th>
<th>Research study</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>0</td>
<td>3</td>
<td>0</td>
</tr>
</tbody>
</table>

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>40</td>
</tr>
<tr>
<td>Practical work</td>
<td>30</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program:** AVT  
**Type and Level of Studies:** Basic applied studies, First level of higher education  
**Course Title:** Musical instruments  
**Instructor(s):** Professor Sonja Krstic, 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.  
8. String instruments. Tonal and directional characteristics.  
9. Woodwind and brass instruments. Tonal and directional characteristics.  
11. Percussion instruments.  
14. Chamber orchestra, philharmonic orchestra and other ensembles.  

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

**Textbooks and References:**  

**Number of active lessons:** 75  
**Other classes:**  
- Lectures: 2  
- Exercises: 1  
- Other: 2  
- Research study:  

**Instruction methods:** Lectures, laboratory exercises, consultations, written exam.  

**Grading (maximum number of points: 100)**  

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>30</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Study Program: AVT, EPO, NET, NRT

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

**Course Title:** Computer Animation 1

**Instructor(s):** Aleksandar Kajevic

**Course Status:** Compulsory

**Number of ECTS:** 6

**Prerequisites:** Knowledge of computer operating system, file management.

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

**Course Outcomes:** Students will be able to individually or in teamwork realize complex projects in area of intermediate technical level of computer animation.

**Course Content:**

*Theoretical instruction:*

1. Introduction, terms, terminology of computer animation. 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
2. 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, clip planes
3. NURBS modeling, curves and surfaces, materialization technology. Scene modeling, materialization of complex contents, texture mapping, texture bump
4. Computer animation technologies, motion, timing, extreme technology, key frame animation
5. 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
7. Rendering 1 – picture finalization technology, Maya's rendering algorithms, control and managing of process of finalization, ray-trace rendering basics, anti-aliasing
8. Rendering 2 – artistic aspects of rendering, types of rendering (photorealistic and plastic-idealistic rendering), output formats, network rendering
9. Advanced technologies of computer animation 1 – procedural animation, dynamics, simulation. Advanced technologies of computer animation 2 – articulated structures animation, inverse kinematics, skeleton and skinning technology

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

Maya workspace, basic operation and work modules

Programs is coordinated with IEEE/ACM Computing curriculum: CC2001 Computer science body of knowledge: CC-GV1, CC-GV2-GV4, CC-GV5, CC-GV6, CC-GV8

**Textbooks and References:**


**Number of active lessons:** 75

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>60</td>
</tr>
<tr>
<td>Practical work</td>
<td>25</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Other classes:**

<table>
<thead>
<tr>
<th>Lectures: 2</th>
<th>Exercises: 1</th>
<th>Other: 2</th>
<th>Research study:</th>
</tr>
</thead>
</table>

---
**Study Program:** AVT

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

**Course Title:** Image Processing

**Instructor(s):** Professor Dragutin Sevic, PhD

**Course Status:** Elective

**Number of ECTS:** 6

**Prerequisites:** none

**Course Objectives:** Introduction to basic principles and postulates that apply in the digital image processing, as well as their specific admitted to practice.

**Course Outcomes:** Training with the understanding that the tools used by digital image processing.

**Course Content:**

_Theoretical instruction:_
1. Introduction to digital processing of multidimensional signals.
2. Two-dimensional systems and basic functions.
3. The perception of pictures. Light, luminance, brightness, contrast.
4. Choosing the quantization of the picture.
5. Fourier transform image.
6. Discrete Fourier transform image.
7. Convolution signal.
10. Transformation techniques.
11. Discrete cosine transform.
12. Other discrete transforms.
15. MPEG coders.

_Practical instruction (Problem solving sessions/Lab work/Practical training)_

**Textbooks and References:**
1. Miodrag Popović, _Digitalna obrada slike_, ETF.
2. Dragutin Šević, _Priručnik za laboratorijske vežbe iz Digitalne obrade slike_, VETŠ.
3. [http://uranus.phy.bg.ac.yu/~dosl](http://uranus.phy.bg.ac.yu/~dosl)

**Number of active lessons:** 75

<table>
<thead>
<tr>
<th>Lectures: 2</th>
<th>Exercises: 1</th>
<th>Other: 2</th>
<th>Research study:</th>
</tr>
</thead>
</table>

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td></td>
</tr>
<tr>
<td>Practical work</td>
<td>30</td>
<td>Oral exam</td>
<td>30</td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Program: AVT

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

Course Title: TV Cameras

Instructor(s): Jadranka Ajcevic

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 (black and white, color camera).
2. Optical system of TV camera: objective, system for color separation, filters
3. Optoelectronic system of TV camera: pick-up tube, CCD sensors.
4. Signal processing system for TV camera.
5. Control system for TV cameras, power supply.
6. Camcorders (functional description, sub-assemblies, division, file formats).
8. Lighting (type, the division, setting up lighting).
9. The composition of images (the basic elements of image, scene composition).
10. TV studio camera (functional description, sub-assemblies, the division).
11. TV cameraman, basic characteristics, work rules and obligations of TV cameraman.
12. Special TV cameras, TV cameras in security systems.
13. Special TV cameras, thermo vision, TV cameras in medicine.

Practical instruction (Problem solving sessions/Lab work/Practical training):
Introduction to the TV camera sub-assemblies. Introduction to the operational functions of the TV cameras. Optical part of the TV cameras, automatic light regulation. Adjusting the white and black level. Camera power supply: battery types and battery handling. Diagnose the status of TV cameras and servicing of TV cameras. Lighting: devices for lighting, filters, setup lightning. The basic elements of television language, rules of recording. Independent recording in studio and on the field. Analysis of recorded TV material

Textbooks and References:

Number of active lessons: 75

Other classes:

Lectures: 2 Exercises: 1 Other: 2 Research study:

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

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>40</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>10</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program:** AVT  
**Type and Level of Studies:** Basic applied studies, First level of higher education  
**Course Title:** Digital TV  
**Instructor(s):** Jadranka Ajcevic  
**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. Digital television systems in Europe and worldwide.
2. Digitization of audio / video signals. Digitalization formats
3. The structure of a digital television system.
6. Compression of images with movement. Standards: H.261, H.264, MPEG-1, MPEG-2, MPEG-4 and MPEG-7
7. The standards of digital television: SDTV, EDTV and HDTV.
10. Transmission of DTV signal via satellite, cable and terrestrial broadcasting systems.
11. Transmission of digital video signals over the Internet.
12. Digital video signals in multimedia communications.
13. Video – phone and video conferencing transmission of video and sound.
14. Digital TV receivers

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


**Textbooks and References:**

2. M. Petrović, *Praktikum za laboratorijske veze*.

**Number of active lessons:** 75

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

**Grading (maximum number of points: 100):**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>40</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
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 Electroacoustics, 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.
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
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

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

Textbooks and References:
1. A. Nizbet, Snimanje i obrada zvuka, Univerzitet umetnosti, Beograd 1990
2. Audio In Media, the group of autors

Number of active lessons: 75

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

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>40</td>
</tr>
<tr>
<td>Practical work</td>
<td>20</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program**: AVT, EPO, NET, NRT

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

**Course Title**: Communicology

**Instructor(s)**: Professor Lelica Kostic, PhD

**Course Status**: Elective

**Number of ECTS**: 6

**Prerequisites**: none

**Course Objectives**: The course aims to provide students with an active writing, observation and understanding of communication in everyday business environment.

**Course Outcomes**: At the end of the course the students will be able to create internal and external communications plans, as well as methods and types of communication via media channels of communication.

**Course Content**:

**Theoretical instruction**:
1. Definition, basic communication models and modes of business communication
2. Basic concepts of the written business communication
3. Communications management in organizations
4. Types and uses of written outgoing documents in business communication
5. Oral business communication. Nonverbal communications
6. Media channels of communication
7. Traditional and interactive media communication systems
8. Creating communication strategies in the organization
9. Criteria and standards of internal documentation
10. Preparing and conducting business meetings
11. Preparing and conducting presentation
12. Criteria and standards of external communication
13. Corporate communication; leadership and communication
14. Business communication in different cultural settings
15. The future of business communication – development directions

**Practical instruction (Problem solving sessions/Lab work/Practical training)**:
Written documents creating: offers, project document, projects.
Oratoratory and public speaking: examples form the business communication practice
Explanation of the system communication through traditional and interactive media
Development of communication programs: Creating communication strategies in the organization

**Textbooks and References**:

**Number of active lessons**: 75

<table>
<thead>
<tr>
<th>Lectures: 2</th>
<th>Exercises: 1</th>
<th>Other: 2</th>
<th>Research study:</th>
</tr>
</thead>
</table>

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td></td>
</tr>
<tr>
<td>Practical work</td>
<td>10</td>
<td>Oral exam</td>
<td>30</td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study Program:</td>
<td>AVT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>---------------</td>
<td>-----</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type and Level of Studies:</td>
<td>Basic applied studies, First level of higher education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Title:</td>
<td>Professional Practice</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructor(s):</td>
<td>Jadranka Ajcevic</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Status:</td>
<td>Elective</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of ECTS:</td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prerequisites:</td>
<td>none</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Objectives:</td>
<td>Connect the knowledge acquired in class to the requirements of practical tasks.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Outcomes:</td>
<td>Training for work in institutions and training for public oral presentation.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Content:</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

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.

| Textbooks and References: |
| Number of active lessons: | 75 |
| Other classes: |

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

<p>| Grading (maximum number of points: 100) |</p>
<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>Written exam</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Practical work</td>
<td>50</td>
<td>Oral exam</td>
<td>30</td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study Program: AVT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type and Level of Studies:</strong> Basic applied studies, First level of higher education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Title:</strong> Video Production</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Instructor(s):</strong> Professor Dragoljub Martinovic, PhD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Status:</strong> Elective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of ECTS:</strong> 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prerequisites:</strong> TV systems and video technologies, TV cameras</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Objectives:</strong> This course teaches technical processes of video production for training and recognition of interdependent technical and artistic aspects in production of audiovisual forms.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Outcomes:</strong> Students will be trained to efficiently understand technical and artistic aspects of video production, with the ability to work in video production team.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course Content:**

**Theoretical instruction:**
1. Forms of video expression.
3. Movies and television grammar (1st 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.
12. Postproduction of audiovisual forms.
13. Sound in video production.

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

**Textbooks and References:**

**Number of active lessons:** 75

<table>
<thead>
<tr>
<th>Lectures: 2</th>
<th>Exercises: 1</th>
<th>Other: 2</th>
<th>Research study:</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Instruction methods:</strong> Lectures, assignments, consultations, knowledge tests, final exam.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>60</td>
</tr>
<tr>
<td>Practical work</td>
<td>30</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Program: AVT

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

Course Title: Sound Design

Instructor(s): Zoran Maksimovic

Course Status: Elective

Number of ECTS: 6

Prerequisites: Sound Recording

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:
2. Nizbet A, Snimanje zvuka, FDU

Number of active lessons: 75

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

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>50</td>
</tr>
<tr>
<td>Practical work</td>
<td>50</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### Study Program: AVT

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

#### Course Title:
TV Production

#### Instructor(s):
Professor Petar Spalevic, PhD

#### Course Status:
Elective

#### Number of ECTS:
6

#### Prerequisites:
Fundamentals of TV

#### Course Objectives:
Understanding the principles, technologies and devices used to be used for studio and outside studio TV production.

#### Course Outcomes:
Training engineers for jobs in the TV studio, and to work with TV sets that are used in the study and study outside of TV production.

#### Course Content:

**Theoretical instruction:**
1. Technology Study and TV production studio outside. The structure and organization of work.
2. Storage Media video. (Formats, tapes, disks).
3. TV studio. Light sources and lighting systems. Virtual studio.
5. TV configuration system. Video effects.
7. Connecting video equipment in the TV system.
9. Synchronize analog and digital TV systems. The timing of the TV system.
14. Problem solving sessions/Lab work/ Practical training:
15. Understanding the TV system video signal, and roads.
16. Introduction to analog and digital video signals.
17. Connectors and cables of the TV system.
18. Synchronization sources images in TV systems.
19. Measurement of the frequency characteristics of the television studio equipment.
20. Recording and playback signals video different formats.
22. Shooting with two cameras in the TV system using a variety of effects on the video mixer.
23. Recording with three cameras in the TV system using chrome key effects on the video mixer.
24. Simulation of a direct transfer - filming three TV cameras using digital effects to video mixer and text and graphic files from a computer.

#### Textbooks and References:

#### Number of active lessons: 75

<table>
<thead>
<tr>
<th>Lectures: 2</th>
<th>Exercises: 1</th>
<th>Other: 2</th>
<th>Research study:</th>
</tr>
</thead>
</table>

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

#### Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>40</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Program: AVT, EPO, NET, NRT, RT

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

Course Title: Fundamentals of Management

Instructor(s): Professor Zivorad Vasic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

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

Course Outcomes: After completing this course, students will be able to manage in the existing enterprise 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.
5. Management, production, human resources and finance management.
6. Planning process. Plans types and the content of individual plans.
7. The process of organizing. The principles of organization and organizational development.
8. The process of personnel (employment). Identifying needs, finding, selecting and receiving personnel (employers).
9. The process of leadership. Direction and coordination, communication and managers decision-making.
10. The process, Phase control, the principles of control, process of control in the company.
11. The decision making process. Defining the decision-making process about the development of enterprises, decision-making methods.
12. Information system for management of the company. Information and information system.
13. Manager. Role and tasks of managers, education, selection and training of managers.
15. Managing change and innovation.

Practical instruction (Problem solving sessions/Lab work/Practical training):
Auditory exercises follow the lectures, where students solve real problems and case studies from analyzing, planning and decision making.

Textbooks and References:

Number of active lessons: 75

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

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>5</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>15</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study Program: AVT</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>--------------------</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Type and Level of Studies: Basic applied studies, First level of higher education</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Title: Music Production</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Instructor(s): Djordje Petrovic</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Status: Elective</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Number of ECTS: 6</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Prerequisites: Sound Recording, Sound Design</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Objectives: Mastering the practical and theoretical knowledge necessary to produce music.</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Course Outcomes: The training for work in music production.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course Content:**

**Theoretical instruction:**
1. Organization of work in the studio to produce music.
2. The role of music producer in the process of creating music clip.
3. The use of stereo mic technique in recording music.
4. The use of close-miking techniques in the multi-channel recording music.
5. Specifics of the recording of acoustic musical instruments.
7. Specifics of recording electronic musical instruments.

**Practical instruction (Problem solving sessions/Lab work/Practical training):**
Multichannel recording of percussion 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. Recording strings. Organization of the recording, the division of work and communication with a musician. Recording wind instruments. Organization of the recording, the division of work and communication with a musician. Record main and supporting vocals. Organization of the recording, the division of work and communication with a musician. Outside the studio recording music.

**Textbooks and References:**
2. Petrović Đ, *Snimanje zvuka i tonska režija*, skripte FMU

**Number of active lessons:** 75

**Other classes:**

<table>
<thead>
<tr>
<th>Lectures:</th>
<th>Exercises:</th>
<th>Other:</th>
<th>Research study:</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>0</td>
<td>4</td>
<td></td>
</tr>
</tbody>
</table>

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>50</td>
</tr>
<tr>
<td>Practical work</td>
<td>50</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Program: AVT

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

Course Title: Computer animation 2

Instructor(s): Aleksandar Kajevic

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Students study advanced technologies of computer animation and their technical implementation in individual or team professional circumstances

Course Outcomes: Through teamwork in multidisciplinary environment, technical and creative talents of students are realized in the implementation of complex computer animated content. Laboratory exercises are realized through Maya and other supporting programs

Course Content:

Theoretical instruction:

Practical instruction (Problem solving sessions/Lab work/Practical training):
Practical classes are individual, adjusted to interests and creative potential of individual student. Classes are coordinated to subjects GV4, GV6, GV7 and GV8, from IEEE CC2001 Computer Science volume

Textbooks and References:
1. Summary of texts from classes

Number of active lessons: 75

Instruction methods:
Lectures (demonstration with video projections), laboratory exercises (practical with video projections and individual corrections)

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>60</td>
</tr>
<tr>
<td>Practical work</td>
<td>25</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>5</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Program: AVT

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

Course Title: Multimedia Signal Distribution

Instructor(s): Professor Mile Petrovic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Introduction to the principles, technologies and devices used for distribution of multimedia signals in cable television systems.

Course Outcomes: Student should be able to independently design, implement and maintain multimedia distribution system and the TV, and to work with devices that are used for distribution of TV signals.

Course Content:

Theoretical instruction:

Practical instruction (Problem solving sessions/Lab work/Practical training):
Exercise 1: Measuring the level of reception of analog and digital signals on the antenna system of terrestrial and satellite TV broadcasting. 2. Spectral analysis of the received signals. 3. Alignment and adjustment of signal level in the process of elements configuration in the main station. 4. and 5. Measuring of the TV signal level in the passive network elements; splitters. 6. Determining and adjusting the gain in the line amplifier for indoor and outdoor installation. 7. Construction of the cable TV system with and without line power. 8. Adjustment and measurement of the TV signal level in the TV/FM sockets. 9. Implementation and simulation of the result obtained from the project task.

Textbooks and References:
1. M. Petrovic, Script, College of Vocational Studies for electrotechnics and computer science, Belgrade, 2005.
2. M. Petrovic, Laboratory practicum, College of Vocational Studies for electrotechnics and computer science, Belgrade, 2005.

Number of active lessons: 75

Instruction methods: Teaching is organized through lectures and laboratory exercises.

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>40</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program:** AVT  

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

**Course Title:** Multimedia Production  

**Instructor(s):** Jadranka Ajcevic  

**Course Status:** Elective  

**Number of ECTS:** 6  

**Prerequisites:** Basic knowledge of television technology and audio/video softwares  

**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 develope 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. Hardware and software for multimedia production  
2. Audio/video capturing, editing  
3. Advanced nonlinear editing  
4. Compositing of video and 2D graphic images  
5. Compositing of video and 3D images  
6. Studio recording with chroma key  
7. Color correction on video materials  
8. Special effects in video  
9. Video and multimedia formats  
10. Interactive DVD presentations  
11. Animation techniques  
12. Principles of animation  
13. Integration of multiple media techniques  
14. Students' discussions  

*Practical instruction (Problem solving sessions/Lab work/Practical training):*  
Final Cut Studio applications for the creation of multimedia projects (video and audio editing, advanced techniques, special effects, title design, motion graphic design, interactive DVD production).  

**Textbooks and References:**  

**Number of active lessons:** 75  

<table>
<thead>
<tr>
<th>Lectures: 2</th>
<th>Exercises: 1</th>
<th>Other: 2</th>
<th>Research study:</th>
</tr>
</thead>
</table>

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

**Grading (maximum number of points: 100)**  

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>40</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program:** AVT, NET  
**Type and Level of Studies:** Basic applied studies, First level of higher education  
**Course Title:** Electrical Installations and Lighting  
**Instructor(s):** Ivana Vlajic-Naumovska  
**Course Status:** Elective  
**Number of ECTS:** 6  
**Prerequisites:** Knowledge of basic concepts in electrical engineering and advanced mathematics.  
**Course Objectives:** Introduce students to the design and execution of electrical installations and electrical lighting.  
**Course Outcomes:** Students will be able to design and execution of electrical installations and electrical lighting.  

**Course Content:**  
*Theoretical instruction:*  
1. Introductory lecture (the organization and content of the course). Technical regulations for the execution of the electrical installations. Electrical installation project. Standards. Technical recommendations.  
2. Definition and classification of the electrical installations (EI), EI of the high and low voltage, levels of voltage, safety systems of the power supply.  
3. The receivers of electricity. Reactive power compensation.  
4. Basic components of the high voltage system EI. Conductors: isolated, non-isolated; heating and cooling. cable utensils. Permanently permitted current.  
5. Cables. The installation and cable accessories. Switches, fuses and other protective components.  
6. Special industrial installations. Electrical installations in areas with a risk of fire or explosion.  
7. EI protection against overload, short circuit protection and selectivity.  
8. Protection against direct and indirect contact, electric shock. TN, TT, IT systems.  
10. Grounding systems. Parts of the grounds, protecting, working, lightning conductor and combined (united) grounds, types of the ground electrodes.  
11. Installation of lightning conductors. Elements of installation, levels of protection, protected areas. Project of the lightning-conductor’s installation.  
12. Preparation and execution of electrical installations  
13. Electrical lighting. Luminous sizes and units, electrical sources of light and lamps. indoor and outdoor lighting, public lighting, finishing elements, emergency lighting  
15. Computer design of the electrical installations.  

*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 EI  
4. G. Dotlić, Electrical Engineering (through standards, laws, regulations and technical recommendations), SMEITS, Belgrade, 2009.)  

**Number of active lessons:** 75  
**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. During laboratory exercises, each student works on the project of wiring and lighting the house or the apartment. After that, students have to present their work and defend the project.  

**Grading (maximum number of points: 100)**  

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures</td>
<td>2</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td></td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Study Program: AVT

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

Course Title: Media and marketing

Instructor(s): Professor Zivorad Vasic, PhD

Course Status: Elective

Number of ECTS: 6

Prerequisites: none

Course Objectives: Main goal is acquisition of basic knowledge on the management of marketing and media performance.

Course Outcomes: After course students will be able to plan, monitor and control the process of marketing and media representation of company, products, services or other promotional activities.

Course Content:

Theoretical instruction:
1. Definition, role and tasks of the marketing in business systems
2. Analysis of marketing opportunities. Management of marketing information and measuring of the market demand
3. Developing of marketing strategy. Positioning of the market offer, development of new products and services, choice of strategy, design and management of global marketing strategies
4. Shaping the market. Management of integrated marketing communications, advertising and public relations, direct and on-line marketing
5. Selection and management of marketing channels. The marketing channels, marketing intermediaries, channels in service industry
6. Channel management decisions. Selection, motivation and evaluation of channels participants. Modification of agreement on the channel
7. Dynamics of channel. Vertical, horizontal and multi-channel marketing systems. Collaboration, conflicts and competition on channel, types and causes of conflicts. Conflicts resolving, legal and ethical issues
8. Advertising management. Sales improvement and public relations management, determining the goals of advertising, deciding on advertising budget, selection of advertising messages and media. Assessment of the efficiency and effectiveness of advertising
9. Sales improvement. Purpose of sales promotion, main decisions about sales improvement
10. Public relations. Major decisions in improvement of public relations
11. Main channels of direct marketing. Direct mail marketing, stock marketing, and telemarketing. TV marketing and other major media marketing with direct response, kiosk marketing and on-line channels 21st century marketing — On-line marketing. Benefits and channels of on-line marketing
12. Implementation of integrated marketing
13. Public and ethical issues in the implementation of direct marketing
14. Marketing efforts management. Organization, implementation, evaluation and control

Practical instruction (Problem solving sessions/Lab work/Practical training):
Assignments from the network planning, analysis of structure, time and project costs, project optimization

Textbooks and References:

Number of active lessons: 75

Other classes:
Lectures: 2 Exercises: 1 Other: 2 Research study:

Instruction methods: Teaching is organized through lectures and laboratory exercises.

Grading (maximum number of points: 100)

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td>10</td>
<td>Written exam</td>
<td>30</td>
</tr>
<tr>
<td>Practical work</td>
<td>10</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>50</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Study Program:</td>
<td>AVT</td>
<td></td>
<td></td>
</tr>
<tr>
<td>----------------</td>
<td>-----</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Type and Level of Studies:</strong></td>
<td>Basic applied studies, First level of higher education</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Title:</strong></td>
<td>Sound System Engineering</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Instructor(s):</strong></td>
<td>Dragan Drincić</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Status:</strong></td>
<td>Elective</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Number of ECTS:</strong></td>
<td>6</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Prerequisites:</strong></td>
<td>Basics of Electroacoustics, Basics of Audio Technics</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Objectives:</strong></td>
<td>To give the student a comprehension of the engineering and use of audio systems</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Course Outcomes:</strong></td>
<td>To be able to solve problems and work with audio systems.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

**Course Content:**

*Theoretical instruction:*
1. Audio system's architecture. Definitions
2. Loudspeakers in sound systems (directivity, coverage, line sources, horns
3. Microphones in sound systems (directivity, sensitivity
4. Outdoors sound systems: Inverse square law. EAD. Potential acoustic gain. Needed acoustic gain. Electrical power
5. Speech intelligibility: Speech power and articulation. ALcons, RASTI
7. Central and distributed sound systems: Loudspeaker clusters. Loudspeaker line arrays. Delay in sound systems
10. Sound system equalisation.
11. Audio devices connecting: cables, jackfields and connectors
12. Sound system powering and grounding
14. Multimedia presentation systems.
15. Software tools for sound system engineering. Monitoring system equalization

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

**Textbooks and References:**

<table>
<thead>
<tr>
<th>Number of active lessons:</th>
<th>75</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Lectures:</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Exercises:</strong></td>
<td>1</td>
</tr>
<tr>
<td><strong>Other:</strong></td>
<td>2</td>
</tr>
<tr>
<td><strong>Research study:</strong></td>
<td></td>
</tr>
</tbody>
</table>

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>40</td>
</tr>
<tr>
<td>Practical work</td>
<td>20</td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>30</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>10</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
**Study Program:** AVT

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

**Course Title:** Music Postproduction

**Instructor(s):** Djordje Petrovic

**Course Status:** Elective

**Number of ECTS:** 6

**Prerequisites:** Music production

**Course Objectives:** Objective of this course is to master theoretical and practical knowledge in the field of postproduction.

**Course Outcomes:** Students will be able to work in area of postproduction.

**Course Content:**

**Theoretical instruction:**
1. Frequency-specific processing of audio signals in the postproduction of music
2. Specific time processing of audio signals in the postproduction of music
3. Specific dynamics processing of audio signals in the postproduction of music
4. Use of computers in modern music postproduction
5. Music mix
6. Preparation of recorded music for CD

**Practical instruction (Problem solving sessions/Lab work/Practical training):**
1. Use of devices for audio signals frequency processing in the music postproduction
2. Use of devices for audio signals time processing in the music postproduction
3. Use of devices for audio signals dynamics processing in the music postproduction
4. Music mix
5. Preparation of recorded music for CD

**Textbooks and References:**
1. Dj. Petrovic, Sound recording, script for FMU

**Number of active lessons:** 75

<table>
<thead>
<tr>
<th>Lectures: 1</th>
<th>Exercises: 0</th>
<th>Other: 4</th>
<th>Research study:</th>
</tr>
</thead>
</table>

**Instruction methods:** Lectures and laboratory exercises

<table>
<thead>
<tr>
<th>Grading (maximum number of points: 100)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Preliminary activities</td>
</tr>
<tr>
<td>------------------------</td>
</tr>
<tr>
<td>Lectures activities</td>
</tr>
<tr>
<td>Practical work</td>
</tr>
<tr>
<td>Colloquium(s)</td>
</tr>
<tr>
<td>Seminar(s)</td>
</tr>
</tbody>
</table>
**Study Program:** AVT, EPO, NET, NRT

**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:** 12

**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 (floppy or CD).

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 Viser - a. 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.

**Textbooks and References:**

**Number of active lessons:** 75

**Other classes:**

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

**Grading (maximum number of points: 100)**

<table>
<thead>
<tr>
<th>Preliminary activities</th>
<th>Points</th>
<th>Final Exam</th>
<th>Points</th>
</tr>
</thead>
<tbody>
<tr>
<td>Lectures activities</td>
<td></td>
<td>Written exam</td>
<td>40</td>
</tr>
<tr>
<td>Practical work</td>
<td></td>
<td>Oral exam</td>
<td></td>
</tr>
<tr>
<td>Colloquium(s)</td>
<td>20</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Seminar(s)</td>
<td>40</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
The publication has been funded within the framework of the European Union Tempus programme which is funded by the Directorate General for Development and Co-operation - EuropeAid and the Directorate General for Enlargement.

This publication reflects the views only of the authors, and the Education, Audiovisual and Culture Executive Agency and the European Commission cannot be held responsible for any use which may be made of the information therein.