



**WINNERS OF RECTOR'S PRIZE
IN THE ACADEMIC YEAR
2007/2008**

FIELD OF NATURAL SCIENCES

FACULTY OF SCIENCE

1. Domagoj Baretić: Pyrene-guanidiniocarbonyl-pyrrole conjugate interaction with double stranded DNA and RNA

Within the scope of this scientific work a novel pyrene-guanidiniocarbonyl-pyrrole compound was characterized spectroscopically and the interactions with double stranded (ds)-DNA/RNA at pH 5 and 7 were compared with previously made research (L. Hernandez-Folgado at al., 2008). A novel compound has indicated distinctive interactions with ds-nucleic acids as also better solubility in water. The compound has shown different spectroscopic characteristics within the interactions with G-C and A-T base pares, that was not obvious in the case of the earlier mentioned research. Fluorimetric titration measurements showed similar affinity ($\log K_8 = 5,5-6,5$) of the compound for the most of the examined ds-polynucleotides at both pH values. The fact is that the examined compound did not show specific spectroscopic characteristics within the interaction with ds-RNA what was significant with the earlier researched derivative. According to the aforementioned properties of the compound it is to be expected it will have stronger biological activity in physiologically controlled conditions, than the examined derivative one.

2. Matija Bašić: Derivations of inner symmetric algebra and Weyl algebra in Loday-Pirashvili tensor category.

Loday and Pirashvili introduced an exotic "infinitesimal" tensor product in the category of linear maps, with a motivation in the theory of Leibniz algebras. In this study, for the first time, we have calculated the structure of the module of derivations of the internal symmetric algebra of an object in Loday-Pirashvili tensor category in finite-dimensional case, and the somewhat bigger internal module of derivations of the same symmetric algebra. We have introduced the new notions of the Weyl algebra and the internal Weyl algebra in this context, and made the first step toward the determination of their structure.

3. Nevena Cvetešić, Kristina Majsec: Izolacija čiste tRNA iz transkripcijske smjese kromatografijom na ionskom izmjenjivaču u jednom danu

The study of tRNA molecules and its interactions with proteins is of great significance for understanding protein biosynthesis. Obtaining large quantities of biologically active tRNA in a quick and cost-effective manner is of exceptional importance, as this enables the application of many biochemical and biophysical methods on studies of the structure and function of tRNA and tRNA-binding proteins. tRNA molecules can be obtained by the transcription of a DNA template *in vitro* or *in vivo*. In both cases, the target tRNA molecule needs to be purified from the transcription mixture, or from the total cell tRNA fraction. The present study develops new methods for purification of tRNA. The objective was to develop a rapid method under nondenaturing conditions and to compare this with the standard, time-consuming method, which includes denaturation by urea (preparative gel electrophoresis in denaturing conditions). The method of choice includes ion exchange on a DEAE-cellulose column, since it may proceed under native conditions. The procedure was optimized to achieve the high purity of tRNA. Transcription mixture containing tRNA specific for serine (tRNA^{Ser}), plasmid DNA (template) and various RNA molecules of high and low molecular weight was first subjected to the fractional precipitation by polyethylene glycol that removes high molecular weight nucleic acids from solution. Later, the sample was applied to the DEAE-cellulose column at low ionic strength and with rising ionic strength, the tRNA was eluted. The concentration of the purified tRNA was determined using spectrophotometry. tRNA purity was confirmed using polyacrylamide gel electrophoresis with urea and by evaluation of acceptor activity. For the sake of comparison, the sample of the transcription mixture was divided into two equal parts, of which one was purified with the newly developed method of ion exchange, and the second with preparative gel electrophoresis in denaturing conditions (standard method). The comparison of efficiency, time requirements and the obtained purity of samples showed that both methods give tRNA of adequate purity and biological activity, while three days are saved when using ion exchange as compared, i.e. this process takes one day instead of four days using the preparative gel-electrophoresis method. However, the standard gel method gives a higher yield. Considering the fact that *in vitro* transcription is a relatively expensive method, and that some tRNA molecules produced *in vitro* are not biologically active, a new method is required that would efficiently purify tRNA produced by overexpression of tRNA gene *in vivo*. One method is affinity chromatography using an elongation factor. The present study examines the conditions for formation of the complex between aminoacyl-tRNA and elongation factor (EF-Tu). Purified tRNA^{Ser} is serylated in the reaction catalysed by the enzyme seryl-tRNA-synthetase (SerRS). Purified EF-Tu protein is activated under various conditions and incubated with Ser-tRNA^{Ser}. The stability of the EF-Tu·GTP:Ser-tRNA^{Ser} complex was tested using gel mobility shift assay. The conditions for EF-Tu protein activation that best stimulate formation of the complex were established. These results will be applied for the purification of *in vivo* produced tRNA using affinity chromatography with the elongation factor.

4. **Katarina Ćuk, Marko Gogala: Epigenetic transmission of UV-C stress response in *Arabidopsis thaliana* L.: antioxidant enzymes and Hsp70**

It has already been shown that plants can transmit information about stress exposure to their offspring. It is manifested as an increase in the somatic homologous recombination frequency and probably has an ecological role in preparing the offspring to potentially harmful conditions. Since the mechanism of this epigenetic transgenerational transmission of information is not fully elucidated yet, the aim of our work was to investigate

whether this process could also include other stress responses and not only genetic material repair mechanisms. For this purpose we investigated (1) the activities of enzymes (catalase, ascorbate peroxidase and guaiacol peroxidase), which have an important role in the process of plant adaptation to stress and (2) the induction of the heat shock protein Hsp70, which catalyses the correct folding of proteins denatured as a consequence of stress conditions. Our experimental object was *Arabidopsis thaliana* (ecotype Columbia) exposed to UV-C irradiation and its non-irradiated offspring. The activity of catalase was significantly decreased in plants exposed to UV-C irradiation in comparison to non-irradiated plants, while the activity of guaiacol peroxidase was significantly increased. The ascorbate peroxidase activity was not significantly changed but there was an evident induction of the Hsp70 protein in irradiated plants, observed as a new Hsp70 protein isoform.

In the first offspring generation of irradiated plants, which were not exposed to UV-C irradiation themselves, a significant decrease in catalase and ascorbate peroxidase activity was noticed in comparison to plants whose parents were not irradiated. There was no significant change in guaiacol peroxidase activity or induction of Hsp70 protein in the offspring of irradiated plants in comparison to their control.

The obtained results indicate that, besides the already known increase in frequency of somatic homologous recombination, transmission of information about exposure to stress can also include changes in antioxidant enzyme activities (catalase and ascorbate peroxidase). The explanation for the observed changes has to be established in further research.

5. Adam Jakov Deak: Analysis of protein E-Cadherin in meningelial tumors in brain

The work presented in this paper is focused on immunohistochemical analysis of protein E-Cadherin in 33 meningioma. This protein is component of adherents junctions, but is also indirectly involved in the Wnt signaling. Using immunohistochemical staining of E-Cadherin I have determined relationship between level of expression and patients age. Moreover, I showed that high level of expression is most common.

Between 33 samples there were 16 male and 17 female patients, and their mean age at diagnosis was 60,4 years. Majority of subjects had high level of expression (43%), Moreover, there were relatively high percentage with low expression (24%). I obtained interesting result with patients that had tumor classified as grade III where 50% of them had low level of expression of E-Cadherin.

With these findings I showed that in meningioma there is change of level of expression of E-Cadherin. My findings may contribute to better understanding of meningioma genetic profile. I consider my finding small but relevant contribution to understanding pathophysiological mechanisms of meningioma.

6. Zoran Kokan: Polymorphic forms of molybdenum(VI) and N-salicylidene-3-hydroxypyridine complexes

The three polymorphic forms of molybdenum(VI) complexes with tridentate Schiff base were synthesized. Ligand is comprised of two aromatic rings (pyridinic and benzoic), is a Schiff base by nature and binds to the central atom in a tridentate way (ONO). It was found for each polymorph to form centrosymmetric dimmers through two O-H...N hydrogen bonds and a few weaker interactions. Conditions of crystallization, properties, crystal structure of polymorphs and template synthesis of ligand on the metal center were investigated.

7. Matej Manjarić: The finding of dolphin fossil bones in quartz sand deposit Vranić (SW foothills of Mt. Papuk)

The quartz sand deposit Vranić is located at the foothills of Mt. Papuk close to the village of Orljavac. At the deposit there was found numerous fossilized vertebrates which were eroded or fragmented. Among the well preserved fossils, the majority of which belong to vertebrates (spine bones, rib fragments, and long bones). Using SEM, barite (BaSO₄) was found in specimen which proves that the bones are from marine environment and that they belong to marine spine bones. Comparison of the bones with present day animals allowed us to confirm that the majority of the bones belonged to dolphins and taxonomically to the Order Cetacea (Whales), Suborder Odontoceti (Toothed Whales), Family Delphinidae (Dolphins). Further taxonomical classification was not possible. Four histological samples were taken, and the results confirmed the specimens belonged to the Order Cetacea. Based on the thumb bone we completed a reconstruction of the specimen which allowed us to interpolate its length and weight. The average total length of the specimens is 154 cm, with an average weight of 36 kg. These measurements show that the specimens were most likely belonging to the family Delphinidae. The fossils are of both juvenile and adult specimens with adults being the majority. Part of the fossils can not be labeled as belonging to the Order Cetacea, but rather different marine vertebrates.

Numerous other small bone fragments were also found but their determination was not possible. Stratigraphically the fossils were roughly determined as from the Miocene period, most likely stage Badenian.

8. Jurica Novak, Anđela Šarić: Theoretical vibrational spectroscopy – beyond standard quantum chemistry packages

In this project we designed a program package called RAVA (Routines for Anharmonic Vibrational Analysis) that enables us to construct a multidimensional potential energy surface of molecules in a simple, self-consistent and reliable manner, as well as to calculate the anharmonic corrections to harmonic frequencies. The RAVA package can build the potential energy surface in two different ways, depending on the system observed: by calculating the potential energy on the grid or by a fourth-order Taylor expansion of the potential energy. The anharmonic frequencies can then be obtained by solving the time independent vibrational Schrödinger equation or by the second-order perturbative approximation, which is implemented in the program package. Reliability of the package was tested on two test molecules: N-methylacetamide and acetic acid dimer.

9. Mia Pršić, Antonija Rimac: Thermocline Displacements in the Adriatic

During the East Adriatic Coastal Experiment, performed in the years 2002 and 2003, vertical current profiles were measured. No direct method to determine thermocline position was employed at the time, and therefore we have explored possible indirect methods. Taking into account conceptual model of inertial oscillations in land-locked basins, the thermocline depth was determined by analyzing phase shift between currents in the surface and bottom layers. Data were chosen so that the inertial signal is clear, which implied spring months, weak winds, and detided currents. The interval selected extended from 26 May 2003 (01:00 am) to 27 May 2003 (10:00 am). The currents were

considered in the coordinate system rotating with the inertial period. From the 180 degree phase shift across the thermocline, the time series of thermocline depth was obtained. It revealed that the thermocline was closer to the surface when the currents were directed into the Adriatic, and vice-versa.

10. Mijo Šimunović: Synthesis of novel primaquine derivatives as potential antimalarial drugs

Novel derivatives of primaquine were synthesized in order to improve its antimalarial activity. Urea derivatives were prepared by aminolysis of primaquine benzotriazolide with several hydroxyamines, ethylenediamine or by intramolecular reaction, while carbamates were synthesized from the same precursor and alcohols. All compounds were fully chemically characterized.

11. Dijana Vrbanec: Coronal mass ejection dynamics: The dependence of aerodynamic drag on the mass of the ejection

Coronal mass ejections (CME) are eruptions of plasma and its magnetic field as a consequence of the loss of equilibrium of solar coronal magnetic structures. They are defined as “an observable change in coronal structure that occurs on a time scale of a few minutes and several hours and involves the appearance and outward motion of a new, discrete, bright, white-light feature in the coronagraph field of view”. Three forces are governing the motion of the ejection: Lorentz force, which is the driving force, the gravity force which slows down the ejection, and the aerodynamic drag. The goal of this work was to explore the CME dynamics, with accent on exploring the dependence of the aerodynamic drag on the ejection mass. The CME dynamics in high corona and interplanetary field is mostly determined by the aerodynamic drag, which decelerates CMEs that are faster than the Solar wind and accelerates those which are slower. A sample of 3091 CMEs from the LASCO-CME catalogue was processed in this work. The analysis of the acceleration-velocity relationship shows that massive CMEs are less affected by the aerodynamic drag, than CMEs of smaller mass. An empirical dependence of the coefficient k of the $a(v)$ correlation and the CME mass was established, concurring greatly with the theoretical dependence $k \sim m^{-1/3}$, which was also derived in this work. It is also shown that the x -axis intercept v_0 of the $a(v)$ correlation has higher values for CMEs of larger masses. From these characteristics it can be estimated that the average Lorentz force acceleration in the range of 2-30 Solar radii is in the order $1-10 \text{ ms}^{-2}$. This is very important for the space weather forecasting, since it provides a more accurate prediction of the arrival time of CMEs to the Earth and the onset of geomagnetic storms.

FIELD OF TECHNICAL SCIENCES

FACULTY OF ARCHITECTURE

12. Aleksandra Duka: Hartera – prenamjena tvornice papira u Rijeci

13. **Ante Nenadić, Boško Opalić, Morana Pap:** Realno i virtualno u metodi arhitektonskog projektiranja na primjeru istočnog poslovnog centra u Zagrebu

FACULTY OF ELECTRICAL ENGINEERING AND COMPUTING
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14. **Miro Bezjak, Davor Delač, Aleksandar Prokopec:** VHDLLab, Educational software for modelling and simulation of digital circuits

This paper describes the VHDLLab system used for modeling and simulation of digital circuits. This system is used on Bologna studies at the Faculty of Electrical Engineering and Computing in Zagreb. The system is made according to goals and aspirations of the Bologna process, such as upgrading the quality of education. It is applicable to the field of digital electronics and digital logic. It is devised to soften the learning curve of students who are being introduced to topics such as digital circuit, modeling and simulation.

VHDLLab system has been successfully applied to the course Digital logic on the first semester of the Bologna study of Faculty of Electrical Engineering and Computing (academic year 2007/2008). Impressions and experiences of students who used this system have been described within this paper. The quality of the system is best described by their positive critics.

The system has been made in layers abiding the commonly accepted programming models and architectures, and is therefore completely expandable with new abilities and compatible with existing systems. This allows expansions in future, as well as the possibility of use on other courses.

15. **Fran Frković:** Service Personalization Using Context-Aware Semantic Reasoning

With the advent of the semantic web, it has become possible to describe the relations between concepts in computer-understandable form. Ontologies, data models which describe concepts and their relationships within a domain of interest, are created using the RDF (Resource Description Framework), RDFS (Resource Description Framework Schema) and OWL (Web Ontology Language), with the purpose to enhance the way information is stored in computers and retrieved over the network. Keyword searching, which is mostly used in today's search engines, is replaced with query answering. The paradigm of software agents introduces intelligent and autonomous entities that act as representatives of their owners on the network.

The future of mobile communications aims to create user-oriented environment which takes into consideration the communication context and the status of user's device (location, battery level, etc). With the goal of context-aware service personalization in the next generation networks, a model, which facilitates the intelligent service discovery according to user preferences and terminal capabilities stored in a user profile, is presented. For research purposes, ontologies describing the domain of telecommunication services were created, as well as user profiles ontology based on the modification of the User Agent Profile specification. User profiles are RDF documents comprised of terminal hardware, terminal software and user preferences description. User preferences specify preferred information type, content type, language, quality of service, etc. Also, example descriptions of telecommunication services and a variety of user profiles were created.

In order to unburden the user from all tasks regarding the process of service selection and adaptation for user's device, software agents are implemented using JADE (Java

Agent Development Framework). Such agents, after the user's needs and equipment status is identified, carry out the process of service discovery according to the component of profile describing individual user preferences. After the appropriate content is successfully found, it is adapted for presentation on the specific device using the description of terminal's hardware, also included in the profile. Finally, user receives personalized service and is relieved of any additional processing tasks. Service description in RDF, as well as OWL ontologies describing services and profiles, are stored in semantic knowledge bases. Intelligent agents capable of answering the semantic queries are introduced in the presented research. Service comparison is performed using the semantic reasoning algorithm that is capable of expressing the semantic similarity of concepts, which refer to a known ontology, as a numerical value. The functionality of implemented algorithm is in many ways different from the majority of existing solutions (mostly oriented on the web services) because it can be applied on a wider range of situations, and also expresses the similarity of resource more accurately. The behaviour of implemented agents and reasoning algorithm is verified through case studies, results are analyzed and guidelines for future research are stated.

16. Zeno Jonke, Inga Paukner Stojkov: Prepoznavanje rukom pisane glazbene notacije

The objective of this project is to produce a system that would allow handwritten music symbols to be recognized, prior from a scanned music sheet, in that way making possible to transform an existing paper based music library to a digital music library. To accomplish this objective we proposed an open plug-in architecture that enables using of several different classifiers and feature functions, that can be combined together and upgraded. In addition to primary function of recognition, the system supports all other important steps before recognition as collecting and preparation of samples, and also training classifiers. Furthermore, the system supports editing, printing and playing of a recognized music document, as well as input of handwritten music symbols through a touch screen or a computer pen. Using developed architecture together with an artificial neural network as a classifier, recognition rate of 81% was obtained in the test with music symbols.

17. Srećko Jurić-Kavelj: A probabilistic approach to real-time tracking of variable number of people by mobile robot's perception sensors

In this work a probabilistic method for real-time tracking of multiple moving people with mobile robot's perception sensors is presented. Algorithm is based on Joint Probabilistic Data Association Filter which is used for assignments between detected features and people being tracked, and particle filters which is used for representation of underlying person position and speed uncertainty. To make possible tracking of variable number of people, a novel approach of particle filters management is suggested and verified. Furthermore, adaptation of number of particles in particle filter is implemented, which accomplished significant reduction of computational complexity without loss of people tracking accuracy. Functionality of developed algorithm was experimentally tested with Pioneer 3-DX mobile robot. Algorithm accuracy was tested with simulated experiment.

18. Davor Mihaljević, Robert Ranteš, Petar Mateljak: Robotska alka

The Alka is a knight tournament which has been held every first Sunday in the month of August in town of Sinj, Croatia since 1715, commemorating the victory over Ottoman Turkish invaders. Alka is also the name of object used in the tournament, made of two concentric rings connected with three bars 120° apart. The object is hanged on a rope 3.32 meters above the race track. The contestant (called alkar) rides his horse down the race track and tries to hit the central ring of “alka” with his spear in full gallop.

Main target of this project was to create a robot which will be able to run down the track, hit the “alka” and transmit human voice to the audience. Significant part of the research was biomechanics which consist of observing a live horse and analyzing its movements. On the other hand, it was important to develop own software solution for voice transmitting and picture analysis. The robot was planned to be totally autonomous and it has camera to identify its target and plan the trajectory.

Only way to get information from “real world” is to use camera and recognize the target, “alka” in this case. That is the starting point of every movement and it is very important to determine the center of the “alka”. Next step is to move legs in order to reach “alka”. There is great number of motors, so it is needed to create kinematics model which will generate reference values for all motors.

Mathematical and virtual model were created before implementation, so there was opportunity to test all functions. During the period of simulations, it was developed mechanical construction of prototype robot. The horse is equipped with sensors (camera and microphone) and communication modules (wireless and CAN module). Servo motors are used to move the mechanical construction. Information from camera and microphone are processed by embedded PC and special applications.

Second part of the system is intelligent unit with spear which consists of 4 parts. Its mission is to recognize center of “alka” and point the spear to the center and win the points. Main part is embedded PC with all applications for system operations. Processor and microcontrollers use CAN bus for mutual communication and there is wireless link for communication with user. Processor is in charge of image processing, voice coding and transmitting.

At the end, according to the real Alka, we developed rules of robotic tournament, which will imitate “Sinjska alka”.

19. **Damir Muha:** Numeričko, teorijsko i eksperimentalno istraživanje lijevak antena s umetnutom lećom od metamaterijala s nultom permitivnosti

20. **Zoran Vrhovski, Ivan Jakus, Nataša Kovjanović:** Upravljanje balonom tipa Zeppelin pomoću vizualne povratne veze

This work presents RC blimp (Zeppelin type) control system based on the visual feedback. Mathematical model of the blimp is derived and simulation experiment has been conducted in Matlab SIMULINK environment. The principle of visual feedback has also been investigated by simulation and some characteristic trajectories of blimp movement have been reviewed. Effects that certain actuators (DC motors) have on movement of the blimp explained as well. Implementation of the proposed control system has been done by using internet camera DCS-900 (mounted on the blimp) that captures image in JPEG format. The image, represented in the form of RGB matrix, is transferred to the central processing unit through TCP/IP protocol. Captured image is transposed in grayscale and filtered by using median filter. After the image has been averaged, edge detection has been carried out by using Sobel gradient procedure thus preparing image for object localization. Visual feedback is based on tracking of the

straight line that is positioned on the surface below the blimp. Hough transformation is being used for localization of the straight line. The goal of the control algorithm is to follow the line by using a pure pursuit algorithm. All steps of the image processing can be easily tracked and seen through the graphical user interface that has been programmed as a part of the software tool required for the project. Communication between the central processing unit (personal computer) and the blimp is carried out through radio link, serial RS 232 port and an electronic interface. The blimp can be controlled by two modes of operation: automatic mode and manual mode. In automatic mode blimp is controlled through an algorithm with visual feedback while in manual mode blimp is controlled by using joystick and sliders within graphical user interface.

FACULTY OF CHEMICAL ENGINEERING AND TECHNOLOGY

21. **Andrea Gelemanović, Martina Hrkovac, Nives Šimić:** Uvećanje šaržnog kristalizatora

The nucleation kinetics, crystal grow, agglomeration, and consequently the granulometric properties of crystals are all influenced by the flow patterns and mixing conditions in the crystallizer. Fluid mechanic for three types of mixing (micro-, meso- and macro-) have different impacts on the mentioned processes kinetics. Mixing of suspension, which depend on macro mixing, is extremely scale-dependent. For that reason the scale-up of crystallization process is very difficult.

In order to find the appropriate scale-up criterion, the experiments have been performed in a geometrically similar laboratory crystallizers of three different sizes (scale-up factors 1,76 and 2,73). Pitched blade turbine impeller was used for mixing. Different hydrodynamic conditions were attained with the different mixing intensity. The crystals with similar granulometric properties (crystal shape and size distribution) have to be produced in all three crystallizers. Cooling batch crystallization of potassium chloride from aqueous solution have been performed. Potassium chloride was chosen since the granulometric properties of the obtained crystals are very sensitive to process conditions. The improvement of the hydrodynamic conditions results with the regular shape crystals. The applicability of various scale-up rules based on geometric similarity has been tested without success. Based on the scale-up procedures for turbulent flow with three or more test volumes, the scale-up rule for batch crystallization of potassium chloride is determined.

22. **Fabijan Pavošević:** Sinteza i kvantno-kemijski studij ciklizacije novog oktatetraenskog derivata – Mehanizam termičke (8π , 6π)-elektrociklizacije i spektroskopska identifikacija produkata

23. **Mario Tomeković, Miroslav Marečić:** Cure of the polyester resin in a cylindrical mould heated by warm air

The cure of unsaturated polyester was studied by using an experiment and a mathematical model of a process. The temperature-time profiles were recorded in the centre of resin and also at the outside wall of the cylindrical mould, and in the bulk of the heated air in thermostat.

A numerical model was constructed by taking into account the heat transferred by convection from the air to the mould surface and the heat transferred by conduction through resin, as well as the heat generated by cure reaction. Introduction of the carbon base filler reduced the amount heat generated in the composite. As a result, it lowered the temperature of resin. The convection heat transfer coefficient was determined from independent experiments with glycerol inside the mould.

Recording the temperature-time and conversion profiles developed within the sample, most extensive knowledge of the process can be obtained. The effects of the convection heat transfer

to the mould, and the conduction heat transfer through the mould as well as the internal heat generated by the cure reaction is clearly shown, despite the complexity of the process.

FACULTY OF MECHANICAL ENGINEERING AND NAVAL ARCHITECTURE

24. Matija Hoić: Sustav za navođeno zapisivanje i indeksiranje konstrukcijskog znanja

Knowledge management systems are being developed with the goal of managing large amounts of knowledge which is being generated during product development. Storing of knowledge is no longer a main issue, but rather its capture through searching for which the categorisation is needed. Due to ambiguity of abstract categories developed through examination of engineering knowledge using top-down approach, an approach towards taxonomy generation was taken starting at the lowest level of hierarchy where the elements are well defined and understandable to engineers. Lowest elements are the basics for defining knowledge chunks which consist of set of knowledge records connected to a CAD model of the product. The process of capturing knowledge chunk is called knowledge capture procedure, whose execution builds up a set of structured records which enable high precision during searching for knowledge. This paper suggests 15 procedures for engineer knowledge capturing. Knowledge base structure is suggested in the form of one central base with common record elements and a certain number of individual smaller bases which are specific for each knowledge chunk. Guidelines of search engine for such knowledge base structure are given as well as general plan of two phase experiment for confirming the applicability of the described suggested system.

25. Hrvoje Krpan, Ivica Matanović: Effect of dilution motor oil by fuel on their viscosity, flash point and flame point

There are many producers of engine motor oils on the world market and their offer is very heterogeneous. As the consequence, ordinary purchasers are in dilemma which oil to buy. So, this project deal with examination of the influence of the dilution of the synthetic and mineral oil with two fuels – gasoline (type eurosuper 95) and diesel fuel (eurodizel). Therewith is simulated the situation the case that could really happen – breakthrough of unburned fuel to the engine oil and its mixing and dissolution.

Measured parameters were – dynamic viscosity, flashpoint and flame point and density. Other two parameters were calculated – kinematic viscosity and viscosity index. Obtained results are the base for the conclusion which of the oils could be more resistant to the dissolution of the unburned fuels.

26. Zvonimir Tomičević: Ispitivanje izdržljivosti endoproteze zgloba kuka

The increasing life time expectancy, life style, irregular diet, the increasing body mass together with decreasing physical activity are some of the reasons that lead to frequent incurrance of the arthrosis, reduced mobility and increasing pain in the hip joint region. Hip joint prostheses are the clinical solution that should sufficiently overcome these problems. From the biomechanical point of view hip joint prostheses should maintain life time functionality.

In this paper dynamic determination of endurance properties of hip joint prostheses was carried out according to the international standards ISO7206-1 - ISO7206-8. Specimens used in the experiments were made from different medical materials and produced with different technologies which are currently used in the hip joint prostheses production. Beside product verification, the obtain results will be used in new product developments.

27. Filip Dodigović: Hydrogeological Investigation for Determination of the Site for Investigating-Piezometric Borehole for Groundwater Monitoring in the Jadro and Žrnovnica Rivers Basin Based on Water Frame Directive in European Union

The paper deals with the approach to implement the EU Water Frame Directive relating to the determination of a site for continuous supervisory monitoring of groundwater quantity and quality of total waters with special reference to the springs of the Jadro and Žrnovnica Rivers Basins in the hinterlands of Split. In principle, water in the basin investigated is scarce with underground water flows. Croatian legislation is being used for water quality monitoring at the springs within the public water supply systems, i.e. the springs of the Jadro and Žrnovnica Rivers.

Detailed presentation of the provisions of EU Water Frame Directive on the waters under supervisory and operational monitoring of groundwater quality, geological and hydrogeological properties of the karst Jadro and Žrnovnica basins, completed hydrogeological and geophysical investigations to determine the site for the borehole to monitor groundwater levels and quality of total groundwater quantity in and around the aforesaid springs is given. A drilling method for such sophisticated use is also suggested.

The site for the investigating-piezometric borehole for monitoring purposes in the Dugopolje Region has been determined on the basis of detailed hydrogeological and geophysical investigations (reflexional seismics, geoelectrical tomography, geoelectrical sampling).

The instruments of Hrvatske vode for monitoring single quality parameters in the borehole will be made part of the prevention monitoring system. In this way, continuous groundwater level and quality in the Dugopolje Region will be made possible. If waters are seriously polluted, the supervision system will be alert in time on potential pollution at the water springs of the Jadro and Žrnovnica Rivers. The same borehole can also be used for operational monitoring if the waters of the Jadro and Žrnovnica Rivers basin become polluted.

Finally, we must point out that the borehole in Dugopolje, in the Jadro and Žrnovnica Rivers basin, will be the first completed structure to be used for monitoring total groundwater according to the provisions of EU Water Frame Directive within the Croatian karst regions.

28. Goran Anić, Filip Gjetvaj, Daria Grgurić: Ispitivanje tlačne i savojne čvrstoće betona uz promatranje akustičnom emisijom

Acoustic emission is a non-destructive method for material testing. With this method it's possible to determine the occurrence and location of micro cracks in solid materials, including the concrete. It is also possible to determine maximum force that was applied on a construction in the past. Despite the fact that the first experiments started in the 1940s, acoustic emission potentials in civil engineering have not been fully used so far. Consequently, the methods of testing with acoustic emission have not been standardized. Acoustic emission appears due to stress and cracks which are results of

external load. This paper deals with the relations between load and acoustic emission activities. In addition, a theoretical review of the acoustic emission testing methods and the phenomena appearing during the testing is presented. While manufacturing the samples all necessary testing of fresh concrete was run: testing the speed of sound traveling through the samples was run after 28 days, and the results were compared to those obtained from ultrasound testing; the compression strength testing was run according to standards, eliminating the shear stress by means of rubber backing. During the testing the acoustic emission was observed. The flexural strength testing was also run according to standards. Cyclic loading was applied in both compression strength testing and flexural strength testing in order to observe the Kaiser effect. This paper includes the differences in reading the acoustic emission signal and its behavior during the loading, just before the fracture and at the very time the concrete is fractured.

29. Dorian Jurić, Jozo Kovačić: The Evaluation Of Applying Alternative Methods Of Gathering, Purifying And Managing Household Waste-Waters

It contains several proposed solutions for gathering, drainage any purification of household waste-water for a rural area of the village of Globočevac in the district of Marija Bistrica. Five different solutions, containing both classical and alternative methods, have been juxtaposed, and an optimal solution has been recommended based upon economical, ecological and technological criteria.

30. Kristina Matijević, Vladimir Poljak: Evaluation of hydraulical characteristics of a sewer network using a complex mathematical model

In the city of Karlovac and its nearest surroundings the sewer network is not completed. There is no wastewater purification, so the sewage is released directly into the river bank. A hydraulics analysis, using computer software EPA- SWMM, was carried out for the existing state. Two sets of simulations were performed.

First using the data from the rain gauges, and second for the relevant intensity - duration - recurrence curves. The conclusion is that when using the data from the rain gauges, a more realistic hydraulic image of sewer network is gained. From it, it is possible to simulate reconstruction of the new and the existing sewage network.

31. Sandra Mihalinac, Marija Rogić: Track construction on steel Bridges

There are a large number of steel bridges located in the Republic of Croatia, and most of them are in great need of reconstruction. Noise and vibrations are way over limit that is allowed, thus jeopardizing lives of anybody near them. The upper level on steel bridges could be changed, instead of standard thresholds, attaching tools and rails with some other and different technical solutions. While working on them, there is a changing proposal of a current condition on steel bridges with a rubber mass that could improve the condition, made construction last longer, and also improve the rail conditions. The suggested way of remodeling of upper construction is applied around the world and final results are telling us that this kind of engineering make constructions much better.

32. Duško Relić: Application of self-compacting concrete in aggressive environment

Permeation properties, which include permeability, absorption, diffusivity etc., have been widely used to quantify durability characteristics of concrete. This paper represents

theoretical and experimental study on permeation properties of self-compacting concrete mixes in comparison with traditional vibrated concrete of the same strength grade. Mixes of self-compacting concrete with different volumes of fly ash have been made. Fresh self-compacting concrete properties have been tested with slump flow and L-box tests. The compressive strength at 1, 7 and 28 days was also measured. The results of durability properties, gas permeability, chloride diffusion and initial saturation absorption tests are shown in this study. A comparison between mixes of self-compacting concrete with different volumes of fly ash and traditional vibrated concrete has been made.

FACULTY OF MINING, GEOLOGY AND PETROLEUM ENGINEERING

33. Tomislav Korman: Influence of physical and mechanical rock properties on energetic efficiency of crushing

The basic aim of this paper is to determine influence of physical and mechanical properties on the power consumption of jaw crusher. This paper deals with the following rock properties: compressive strength, tensile strength, hardness and fracture toughness. Dependence of crushing energy and single rock properties was determined by measuring power consumption during the crushing. The most influenced rock properties on energy for stone crushing is compressive strength according to factor of correlation as a result of statistical data processing. Calculated correlations developed in this study need either to be verified or modified, based on the additional testing on larger number of specimens. The correlation factor is calculated based on testing five specimens of different physical and mechanical properties. The results of this test also need to be verified in the practice on jaw crushers used in crushing plants.

34. Sanja Simat: Petrografsko-geokemijska obilježja i arheološki značaj vulkanskih žrvnjeva iz Bribirske glavice u Dalmaciji

FACULTY OF TEXTILE TECHNOLOGY

35. Petra Krpan: Relief surfaces as an inspiration in textile design

The study of various relief surfaces yielded numerous ideas on textile design. In textile design, only one element is being used: a geometrical figure (semicircle, ellipse...). A chosen element is being cut out from different fabrics. However, when working on a design, only one type of fabrics is being used. What we have is a basic element which is being multiplied and arranged in layers that partly overlap, creating different rhythmic-like surfaces. The play of light and shadow and the richness of tonalities of the newly created relief surfaces are being recorded on a photograph, which has led us to study the same phenomenon on a flat surface. The geometrical figure that comprises relief surfaces is turned into a single graphic unit – sign, which is being imprinted on the fabrics. That very graphic unit is being multiplied in different rhythms, interacting and partly overlapping, only to create new tonalities. These newly borne ideas for textile design, both the relief and flat ones, are possible to apply in the production of fabrics for various purposes: from clothes to quilts and carpets.

36. Marijana Tkalec: Stained glass as an incentive for creating textile in interiors

The integration of acquired knowledge about textile, based on the unity of science and creativity, together with exploring stained glass as a painting technique and using sliding partitions in the interior design, has resulted in creating ideas for applying “stained glass as textile.”

While registering the ideas, the materials used were nontransparent as well as transparent. The nontransparent monochrome surfaces are perforated: geometric figures – squares, rectangles, triangles and circles – are carved from them. In the newly created nontransparent monochrome frames, transparent red, yellow, blue and green materials are inserted. The overall visual impression can be seen in correlation of nontransparent and transparent elements of composition. Its full potential is realized when light passes through the transparent elements of the composition.

Ideas that are registered as mentioned before should be carefully developed in the process of their realization, with the cooperation of experts in different areas.

Eventually, the ideas will turn into “stained glass as textile”: functional and decorative textile entities, made by hand or industrially, which can be used as sliding partitions in design of modern interiors.

FIELD OF BIOMEDICAL SCIENCES

FACULTY OF PHARMACY AND BIOCHEMISTRY

37. Lidija Dobša: Radiation resistance of *Deinococcus radiodurans* stationary phase

Bacterium *Deinococcus radiodurans* is extremely resistant to ionizing radiation (x-rays and gamma-rays), UV radiation, desiccation as well as to various chemical mutagens. In fact, it is one of the most radiation resistant organisms known; it can survive a dose of 15 kGy of gamma-radiation – that is 3000 times what it would take to kill a human. Radiation is known to induce double-stranded DNA breaks, the most severe form of genomic damage. While most cells can sustain only several double-stranded DNA breaks, *D. radiodurans* can survive hundreds of breaks due to a highly efficient and precise DNA repair mechanism.

The aim of this work was to characterize in more details stationary phase *D. radiodurans* cells, i.e. to examine their growth, viability and morphology, their sensitivity to gamma and UV radiation as well as the kinetics of DNA repair in these cells after gamma radiation.

The results obtained show that in early stationary phase the cells divide slowly, in middle stationary phase their growth stops while in late stationary phase they start to die. Microscopic analysis revealed that stationary phase *D. radiodurans* cells do not differ significantly in their morphology from exponential cells; however their nucleoids seem to be more diffuse.

In contrast to earlier results which suggest that stationary *D. radiodurans* cells are several fold more resistant to radiation than exponential cells, the results of this work show the opposite; stationary cells were found to be even more sensitive than the exponential ones. This result could be explained by the fact that stationary *D. radiodurans* cells possess less genome copies and more diffuse nucleoids than

exponential cells. Using pulsed-field gel electrophoresis, the kinetics of DNA repair in stationary D. radiodurans cells after gamma radiation was followed. The results of these experiments showed that after irradiation, the cells require specific time to repair their damaged DNA. The time required for completion of DNA repair is longer as the cells enter deeply the stationary phase.

38. **Alen Friščić, Hrvoje Rimac:** Antifungalni i antioksidativni učinci polifenola u uvjetima *in vitro*

39. **Davor Šakić:** A new view at an old reaction. Quantum-chemical study of the chlorination of benzene

Quantum-chemical methods at M05-2X and MP2 levels were used to study the reaction mechanisms of the chlorination of benzene. New intermediates were discovered which extend the formerly known reaction continuum. It is shown that the correct description of the potential energy surface, at which both structure and dynamics of π -complex is described, is to be calculated by high-quality ab initio MP2 method or DFT models which include a high percentage of Hartree-Fock exchange (M05-2X model). Local minimum which corresponds to π -complex could not be located until an acid catalyst is present. All these mechanistic details suggest a new reinterpretation of the chlorination of benzene.

40. **Martina Vasung:** C341T polymorphism for GSTP1- possible protective role and sex dimorphism in multiple sclerosis?

Glutathione S- transferases are of multiple gene family enzymes that participate in phase II drug biotransformation, detoxification, steroidogenesis, and cell signaling. Glutathione S- transferase P1 (GSTP1) is most important large group of nonhepatic enzymes. The very important element in etiopathogenesis of neurodegenerative diseases is genetic basis of effective enzymatic detoxification endogenous and exogenous toxins (neurotoxins). Multiple sclerosis is demyelinating disease MS affects with unknown etiopathogenesis. Frequency of multiple sclerosis is two times more often than multiple sclerosis in men. The disease occurs within 20-55 years. The group contained 232 healthy examinees (aged 18-62 years) and 45 examinees with multiple sclerosis (aged 17-53 years). The group of healthy examinees contained 69% male and 31% female examinees. The MS group contained 33% male and 67% female examinees. We diagnosticated genotypes of A313G and C341T polymorphisms genes for GSTP1 with PCR-RFLP method.

1.) Study results for A313G genotype testing indicate that frequencies of AA/AG/GG genotypes were not confirmed as statistically significant ($p=0,389$) in patients with MS and control subjects.

2.) Study results of C341T genotype testing indicate that frequencies of CC/CT/TT genotypes were confirmed as statistically significant ($p=0,006$) in patients with MS and control subjects.

3.) A313G polymorphism gene for GSTP1 was not described as statistically significant ($p=0,389$), contrary to present C341T polymorphism gene for GSTP1 that indicates a possible protective role in multiple sclerosis (with statistical significance towards the healthy control population $p=0,006$; OR=0,2630, 95%CI (0,0342-2,0211)).

4.) Results for sex dimorphisms was not shown as statistically significant for A313G polymorphism in control group ($p=0.613$), as well in a group with MS ($p=0.670$),

contrary to present C341T polymorphism where results was statistically significant in control group ($p=0.049$) but not in group with MS ($p=0.121$).

This preliminary result indicates potential protective role of T allele in men if C341T polymorphism GSTP1 is present. For additional affirmation of this hypothesis further research is required.

Until today, literature data for C341T polymorphism GSTP1 in patients with multiple sclerosis and frequency of this polymorphism in men and in women was not found.

MEDICAL SCHOOL

41. **Aleksandar Blivajs, Karlo Filipović, Mihaela Jovančević: Effect of Thyroid-Stimulating Hormone on Bone in Thyroidparathyroidectomized Rats**

We show that TSH has a direct effect on bone. Total thyroidparathyroidectomy (TPTx) removes all effects of calciotropic hormones on bone. Thirty four rats were used, of which six were SHAM operated, fifteen were TPTx control group and thirteen were treated with $0.3\mu\text{g}$ of TSH daily. TSH affects bone by inhibiting bone resorption, which is accompanied by low serum calcium and high serum phosphate levels. Serum C-telopeptide levels in TSH treated group were significantly lower, as compared to TPTx control and SHAM rats. TSH treated TPTx animals also had statistically lower serum osteocalcin levels as compared to TPTx control and SHAM groups, showing that TSH, administered on a daily basis, is a negative regulator of bone remodeling. This supports TSH's suggested inhibition of bone resorption. Suppressive effects of TSH were further potentiated by its high serum levels, 4 to 5 times higher in TPTx animals as opposed to SHAM animals. $1.25(\text{OH})_2$ Vitamin D3 levels were remarkably decreased in animals after thyroidparathyroidectomy primarily due to the lack of PTH, but this could potentially also be a suppressive effect of TSH.

42. **Dora Fabijanović: DNA demetilacija u perigastrulacijskom razdoblju mijenja razvoj deciduoma u štakora**

43. **Tomislav Kokotović: Investigation of axin expression in neuroepithelial brain tumors**

We investigated expression of the protein axin in 64 samples of neuroepithelial brain tumors. Axin is a negative key regulator of Wnt signaling pathway and the consequence of its action is reduced cell proliferation.

Localization and level of expression was analyzed by immunohistochemical staining. Tissue from the frontal lobe of the adult brain was used as positive control. In this work, the expression of axin in the healthy adult brain is visualized for the first time.

Localization of expression in normal brain was predominantly in the cytoplasm, while in tumor samples it was cytoplasmic in 43/64, cytoplasmic and nuclear in 12/64, and only nuclear in 7/64. Level of expression was similar to the healthy tissue in 26,56% of our sample, lower in 35,96% and higher in 34,38% of the tumors. Two tumor samples showed complete absence of axin expression.

High incidence of cytoplasmic expression in tumors shows tumor suppressor role of axin, and nucleo-cytoplasmic shuttling or solely nuclear localization in 29,68% of samples suggests existence of possible "salvage pathway". It is assumed that this

pathway would be activated by axin translocation to the nucleus in order to reduce the proliferation of tumors by catching and degrading nuclear b-catenin.

44. Siniša Roginić, Mihovil Pletikos: Development of nitrinergic subplate neurons in the human fetal cerebral cortex

The transient fetal subplate zone (SP) represents a major component of the neocortical anlage and contains a large population of neurons that constitutively express nitric oxide synthase (nNOS). We used NADPHdiaphorase histochemistry stained sections through the telencephalon of human fetuses aged 15, 18, 21 and 26 postovulatory weeks (POW) and of 13-day-old term newborn infant in order to analyze tempo and mode of morphological development of different types of nitrinergic SP neurons. We describe six main morphological types of nitrinergic SP subplate neurons: pyramidal, inverted pyramidal and triangular, bipolar, fusiform, polymorphic, and multipolar. Immature and bipolar forms prevail in the early fetal and midfetal period, but all six types are present from 26 POW onwards and they are in fact most developed in the newborn brain. Significant growth of soma size and dendritic arborization occurs after 21 POW, and dendritic trees of these neurons are the largest and the most complex in the newborn brain. Dendritic differentiation is only partially correlated with ingrowth of afferent axons into the SP and their relocation into the cortical plate, because these neurons attain the peak of their development in the newborn and remain present after the birth as interstitial nitrinergic neurons of the subcortical white matter. These findings suggest that nitrinergic interstitial cells have significant (and hitherto unknown) functional roles in the postnatal and adult brain. Therefore, the next step in our research would be the detailed analysis of their morphology and distribution in the postnatal human brain.

SCHOOL OF DENTAL MEDICINE

45. Valentina Mikulić, Renata Spajić: Radiographic assessment of furcation-involved teeth

The purpose of the study was to investigate the relationship between mandibular first and second molar furcation involvement, and the bone loss at the mesial and distal of these teeth. The influence of an endodontic and prosthetic treatment was also considered. A comparison was made for the patient- and tooth-related variables. A total of 98 orthopantomograms from patients registered at Department of Periodontology (School of Dentistry, University of Zagreb) were available for analysis, both female and male, with a mean age of 50 years. Our measurements included 295 teeth. Mandibular first molars were significantly more frequent endodontically and prosthetically treated teeth, and had more frequently furcation involvement. Mandibular second molars were found to lose comparatively more radiographic attachment mesially compared to first molars. First and second mandibular molars with furcation involvement were found to lose more bone mesially and distally, than teeth with no signs of furcation pathology.

46. Dinka Vinković: The sealing quality of temporary filling materials

Between many temporary filling materials available on the market, Cavit and Systemp.inlay are mostly used. Although both materials showed clinical succes in daily use, the purpose of this study was to compare the sealing quality of two materials Cavit

(Cavit G, 3M ESPE, Lot 301558) and Systemp.inlay (Ivoclar Vivadent, Lot J05940) when used a temporary filling material in cavity. Research has been done on 60 mandibular and maxillar molars extracted for parodontal reasons. The samples were divided into two groups of 30 teeth each. Preparation of class I cavity was made on each tooth. Than cavities were filled with temporary filling materials according to manufactures instructions. Tooth surfaces were covered with two layers of nail varnish and the specimens were put in dye solution (Rotring Ink, R591017, Germany) for 10 days. The teeth were thoroughly rinsed in the water and longitudinally sectioned in a buccolingual direction using a diamond disc (Edenta, Order No. 355.504.190HP). Dye penetration was measured using a stereomicroscope (Olympus Stereo SZX12, Japan). Mean value of leakage was calculated for both materials by Wilcoxon rank sum test, which shows that there was a statistically significant difference between the two materials. Cavit showed better sealing properties (mean value 1,13) during testing period in comparison to Systemp.inlay (mean value 2,33).

47. Joško Viskić: Research of temporomandibular disorders in professional SCUBA divers

Diving has been, for a number of years, recognized as a factor of TMD. Design of the mouthpiece, stress and water temperature may be the leading causes that make diving a factor of TMD. The objective of this retrospective epidemiological research was to determine weather there was a significant difference in the prevalence of TMD in the diver population then in the general population. The standardized RDC/TMD protocol was used on both study groups and a specially designed questionnaire concerning diving on the research group. A total of 85 individuals participated in the research: 55 divers (case group) and 29 individuals from the general population (control group). The results have shown that there is a statistically significant difference between the group 2 and group 3 axis 1 diagnoses of the RDC/TMD. Logistic regression analysis has shown that the diver population is also 15.8 times more likely to develop group 2 left joint and 12 times more likely to develop group 3 right joint than the general population. The Axis 2 diagnoses of the RDC/TMD are also significantly increased in the diver group then in the control group. There was no significant link between the number of dives per year, the satisfaction with the diver mouthpiece with both Axis 1 and Axis 2 diagnoses of the RDC/TMD. The awareness of TMD symptoms is found to be more significant in daily life then during or after the dive. The conclusion of the research is that professional divers are indeed a risk group for the development of TMD.

FACULTY OF VETERINARY MEDICINE

48. Ivan Alić: Comparative archaeozoological analysis from two medieval sites

In this paper, the bones, bone fragments and teeth were examined. The material originates from two medieval sites: Gudovac – Gradina near Bjelovar (totally 285 specimens) and wooden bridge pilots from City Park in Virovitica (totally 139 specimens).

At Gudovac – Gradina site the bone remains and teeth of cattle and pigs were represented equally. At Virovitica site the cattle remains are the most represented. The bone fragments of domestic poultry, primarily fowl, are presented at the both sites. The findings of wild animal (wild boar, roebuck, rabbit, wolf, fox) bone remains refer to hunting, primarily for meat, but probably for fur too.

By osteometric analysis, which was taken on the cattle metapodial bones, the sex was classified. The withers height was estimated: for cows it is 106, 25 cm and for bulls 119,70 cm.

49. Vladimir Farkaš: Craniometrical analysis and sexual dimorphism of brown bear (*Ursus arctos*, L.) in Croatia

Bears (Ursidae) lean towards changing some characteristics under influence of environment and nutrition. The goal of this paper is to analyze craniometrical measurements of brown bear (*Ursus arctos*, L.) population in Croatia with objectives to define craniometrical characteristic of population and to determinate differences between sexes. Totally 34 skulls have been researched, out of which 13 (38.24%) belonging to female animals, 20 (58.83%) to males, while sex was not identified for one (2.93%) skull. Totally 49 measurements were measured on each skull. Except some craniometrical characteristic, for 16 measures we defined border values that can help in sex determination. Correlation and equation of regression are calculated for total length of skull and zygomatic breadth.

50. Vedran Slijepčević: Telemetry study of Eurasian lynx (*Lynx lynx*) in Croatia

Eurasian lynx (*Lynx lynx*) is the largest European member of cat family. Lynx population in Croatia inhabits Gorski kotar and Lika region. Data about biology of that large carnivore in Dinaric Mountains are rare. Research of lynx movements and activity in Croatia started in 2001, but due to high expenses, small number of lynx, seldom opportunities for capturing and collaring and many other difficulties, there are not many data available. Telemetry study of Eurasian lynx (*Lynx lynx*) was conducted on 4 animals; two adult males, one adult female and one subadult female in Gorski kotar in Croatia from 30th of September 2006. till 7th of April 2008. Animals used in this study were captured in traps equipped with GSM alarms, chemically immobilized with mixture of medetomidine and ketamine, measured, collared with GPS and VHF collars, microchipped and released on location of capture. Data presented in this study shows that adult males have larger territories than adult females with kittens and that females with kittens in average have a higher speed of movement than males.

51. Martin Vujić: INVASION SPECIFICITY OF RED DEER (*Cervus elaphus*) WITH GIANT LIVER FLUKE *Fascioloides magna*

Fascioloidosis, the disease caused by *Fascioloides magna* almost a century have threatened red deer and roe deer populations in Europe. Progressive spread of the disease from the Central to the South Eastern part of Europe caused the dramatic increase of infected animals in Croatia too. From the first report of the disease dating in 2000 up to now the disease caused also a significant economic loss. The autochthonous final host of this liver fluke is white tailed deer that is rather frequently infected but with no signs. Oppositely, all other cervids and investigated domestic animals are very susceptible. The knowledge of pathogenesis of the disease is moderate only for the deers of the New World and for domestic ruminants. The consequences of the infection in the red deer are not known. The aim of this investigation was to define the patterns of lesions in the liver but not only. We were curious about the structure and the content of the cysts. Totally five types of cysts with various morphological patterns were found in infected livers. Every type of the cyst was described according the content with the special emphasis on fluke eggs. A controversy was found when the quantity of eggs in the cyst was compared to the number of eggs in the feces. According to the results it can

be concluded that the number of eggs in the feces is not correlated at all to the parasitological status of the animal.

52. Lana Vukoša: SEASON INFLUENCE ON INTERKIDDING PERIOD AND SERVICE PERIOD OF BOER GOATS IN CROATIA

The aim of this study was to determine season influence on duration of service-period and interkidding period of Boer goats in north-west Croatia (Europe) as well as influence on the duration of interval from partus to next conception. We investigated 55 Boer does between 2-8 years old through 6 year period. After kidding, does were kept with kids three to four months until weaning. A few bucks were in groups too. The mean interval from partus to conception (service-period) recorded in our investigation was $108,22 \pm 4,42$ days. In north-west Croatia the intervals from partus to conception were between $30 \pm 2,46$ (does kidding in September) and $165 \pm 3,11$ days (does kidding in January). We have determined that interkidding-period lasts, in average from $183,00 \pm 3,63$ in October till $317,94 \pm 3,12$ days in January. Comparing the results of the mean interkidding period we have determined significantly longer mean interkidding period in winter and spring ($P < 0,05$) than in summer and autumn. The mean interkidding period in Boer goats was the longest in a winter $309,70 \pm 2,66$ days and the shortest in autumn $229,73 \pm 8,29$ days. While, in Boer goats interkidding period lasts $279,56 \pm 2,44$ days in spring and $242,41 \pm 4,30$ days in summer. Most of does give birth in late winter (43%), early spring (33%) and only 24% in summer and autumn period (15% and 9%, respectively). We have established that 30 years after importing in Europe, Boer goat is becoming seasonal polyoestrus animal.

FIELD OF BIOTECHNICAL SCIENCES

FACULTY OF AGRICULTURE

53. Darija Bendelja: CHARACTERISATION AND RESEARCH OF THE MILK QUALITY IN KRK CHEESE MANUFACTURING

Physical-chemical composition and hygienic quality of milk are of crucial importance in cheese manufacturing. During 2007, a research was carried out with the aim to investigate manufacturing features and milk quality of Krk sheep and to describe technological procedure of manufacturing and physical-chemical composition of Krk cheese. The milking capacity was checked according to AT method. Chemical composition was analysed by infrared spectrometry and hygienic milk quality by fluoro-opto-electronic method, i.e. flow cytometry method. In 160 day lactation, sheep produced on the average 108 kg of milk (38 kg in lactating and 70 kg in milking period), 5.67 kg of milk fat and 4.12 kg of protein. On the average, the milk contained: 19.49 % of dry matter, 8.29 % of milk fat, 5.99 % of proteins, 4.45 % of lactose and 11.32 % of dry matter without fat. Milking had a significant influence on: daily milk quantity, dry matter and milk fat share, milk freezing point and hygienic milk quality (log₁₀MO and log₁₀BSS). Significant correlation coefficients were determined between manufacturing features of sheep and certain milk quality indicators. Based on the research results, criteria of physical-chemical composition, microbiological and sensory milk and cheese

quality can be suggested, necessary in standardisation of technological manufacturing procedure of the Krk cheese.

54. **Maja Ferencaković:** Polimorfizam *DGAT1* gena u populaciji istarske ovce

In our region people breed sheep for centuries. Very important product of sheep is milk that is mostly made into quality cheese. In Croatia, in Istria, the most common breed is a local breed Istrian sheep. There are many elements that affect the composition and the amount of milk, and the most important is genetic potential. Heretofore selection has been made solely by methods of quantitative genetics, but now molecular genetics is taking its place. Molecular genetics gives us insight into genome so we can also detect mutations such as K232A *DGAT1* gene mutation of cattle which is known to affect the composition and the amount of milk. Diacylglycerol acyltransferase 1 (*DGAT1*) belongs to the three known members gene family. Diacylglycerol acyltransferase catalyses the final step in triglyceride synthesis. Sequence of *DGAT1* cattle consists of 1470bp, and 21 SNP are found in it. 18 of those are in non coded regions, and 1 on 8th exon is a "silent" mutation (SNP 245). Double substitution (SNP 252 and 253) located on 8th exon represents the "missense" mutation that results in substitution of lysine into alanine Lys232- Ala. The mutation is on 10433/10434 position. Lysine, or K232, has AAG sequence. Alanine, or A232, has GCG sequence. Cattle and sheep are of very similar descending, and researches show less than 3% difference in coding nucleotide positioning. Because of that similarity and the fact that the sheep genome is not completely sequenced, the existence of mutations on sheep was expected. 138 blood samples were taken from Istrian sheep and DNA was isolated, PCR-RFLP reaction was done on them with a primer for cattle *DGAT1* forward: 5'-GCACCATCCTCTTCTCAAG-3 and 'reverse: 5'-GGAAGCGCTTTCGGATG-3' and *CfrI* restriction enzyme. One of the samples has been given for sequencing. The result of PCR-RFLP did not confirm the existence of K232A mutation, and the sequence alignment showed that the sequence of sheep matches the sequence of cattle with 3.38% and 2.82% difference in nucleotide positions. On the position of 10433/10434 for cattle, sheep have the AA pair that leads to AAG codon and codes lysine amino acid.

55. **Martina Kmet, Maja Ščavničar, Marija Tomić:** Effect of inoculation and nitrogen top-dressing on yield and quality of new genotypes winter pea and wheat mixture

Forage peas (*Pisum sativum* L.) are becoming the more represented forage leguminoza on the fields Republic of Croatia. One year field trials (2006-2007) were carried out to determine the effect of new genotypes winter pea seed inoculation and nitrogen top-dressing on the dry matter yield and quality of winter pea and wheat cv. Sana. Just before sowing the inoculation of pea seeds was performed by the indigenous variety of *Rhizobium leguminosarum* bv. *viciae* 1001 which is part of the microbial collection of the Department of Microbiology at the Faculty of Agriculture University of Zagreb. The highest nodule number on genotype of pea G1 root (45 nodule/plant) was determined on the inoculated variant as well as nodule dry weight (0,225 g/plant). Average dry matter yields were ranging from 7,30 t ha⁻¹ (genotype G1) up to 6,70 t ha⁻¹ (genotype G4). Average crude protein yields were ranging from 1150 kg ha⁻¹ (genotype G1) up to 950 kg ha⁻¹ (genotype G4). The conclusion of this research is that the highest of dry matter yield (8,80 t ha⁻¹) and crude protein yield (1498 kg ha⁻¹) was obtained with the new genotype forage winter pea (G1).

56. Igor Palčić: Određivanje onečišćenja zraka sumpor (IV)-oksidom pomoću bioindikatora

Green plants contribute a lot to the life quality on certain area. To achieve this function it has to be healthy. Many abiotic and biotic (pests) factors have negative influence on plant's health. Very important abiotic factors that harm the plant's health are different pollutions in atmosphere. They affect plants directly, but also human beings. This is a reason for monitoring the air pollution, and conduct measures to prevent such pollutions. There are different methods of air pollution monitoring and measuring, and one of them are bioindicators. Bioindicators are organisms that show presence of air pollution, including sulphure dioxide. They are based on the presence of specific reactions and symptoms caused by air pollution. There are two main goals in the conducted research:

1. to understand different plant reactions on air pollution.

2. to understand the correlations

between the nearness of pollution sources and pollutant levels. According to the fact that in the city of Sisak there is a refinery, a power plant, an ironworks and other important pollutant sources, the Sisak's area was chosen for this research. Ten sites were included in the area around Sisak and Petrinja, including the site Stari Brod as a control site without pollution. The research involved four types of trees- oak, birch, poplar and lime tree. Used assays' dimensions were 5x5, and they were elaborated in lab for analytic chemistry. The pH value and buffer capacity was measured for 162 assays. In so doing, the main supposition was that the sulphure dioxide's presence increases the pH value and buffer capacity. The conclusion was that oak tree is the most sensible to sulphure dioxide's pollution, then comes birch tree, and finally lime tree and poplar tree are the most resistant. Highest levels of pollution were measured in Caprag, the site where the industry is concentrated, and pollution levels became lower by moving away from pollution sources.

57. Mario Skelin, Ivan Skelin: Flora of island Zečevo – apendix to flora of island Hvar

Island Zečevo is situated 2 km north-east of town Vrboska on island Hvar. Its area covers 113 288 m² and its coastal length is 1539 m. The climate is mediterranean so the island receives 772 mm of annual rainfall. Island Zečevo has a status of a protected area since 1972.

Flora research on island Zečevo was conducted during the vegetal seasons in 2006 and 2007. During the terrain research 123 species of self-grown vascular flora distributed in 47 families were discovered. The most abundant families were plants from pea family (Leguminosae, 13%), daisy family (Compositae, 11%), grass family (Gramineae, 9%) and mint family (Liliaceae, 6%).

Considering the fact there has been no flora research on the Island of Zečevo so far, this research has set the founding stone for further exploration.

FACULTY OF FOOD TECHNOLOGY AND BIOTECHNOLOGY

58. Petra Burić, Iva Nižić, Ivan Radoš: Preparation of biologically active quaternary salts of vitamin B6 derivatives

The goal of this work was preparation of biologically active quaternary salts of vitamin B6 derivatives. The condensation reactions of quaternary salt 3-hydroxy-4-

hydroxyiminomethyl-5-hydroxymethyl-1,2-dimethylpyridinium iodide with two aromatic aldehydes in methanol by adding catalytic amount of piperidine gave two novel quaternary styrylpyridinium salts [3] and [4]. Furthermore, by anion exchange reactions (metathesis) two pyridoxal oxime salts 3-hydroxy-4-hydroxyiminomethyl-5-hydroxymethyl-2-methyl-1-R-phenacylpyridinium bromides (R=H, Cl) were converted into chlorides. Four (4) novel, yet not published compounds were synthesized, and their structures determined according to the data obtained by IR spectroscopy, ¹H- and ¹³C-nuclear magnetic resonance.

59. Ranko Gaćeša: The Influence of Synonymous codon positions on palindrome content in yeast *Saccharomyces cerevisiae* genes

Palindromic sequences, present in the genomes of all organisms, have been found to play an important role in the regulation of various cellular processes, while on the other hand they present a potential threat to genetic stability. In previous work conducted in our laboratory, we have shown that shorter palindromes are underrepresented in the yeast genome, particularly in coding regions. To explain the underrepresentation of palindromes in coding regions, we have hypothesised that intragenic variations in codon usage may be a way to control the amount of palindromes within genes. To test this hypothesis, we have first developed an original computer program for synonymous codon shuffling. Using this program we have conducted a Monte-Carlo analysis of the palindrome content in approximately ~3200 well-characterized genes of the yeast *Saccharomyces cerevisiae*. This analysis has unambiguously demonstrated the existence of a new and yet undefined process which operates to reduce the number of palindromes in the genes, while the preliminary analysis of the correlation between the number of palindromes and gene expressivity has pointed to a possible relationship between the number of palindromes and gene expression.

60. Marina Miklenić: ANALYSIS OF SPECTRUM OF GENETIC EVENTS DURING GENE REPLACEMENT IN YEAST *Saccharomyces cerevisiae*

In yeast *Saccharomyces cerevisiae* non-replicative transforming DNA is integrated into yeast genome much more often by homologous, than by illegitimate recombination, while in the cells of most other eukaryotic organisms, including animals, it is quite the opposite. High frequency of integration of transforming DNA by homologous recombination makes yeast *S. cerevisiae* a suitable model organism for investigation of recombination "ends-out" (gene replacement). Gene replacement is a widely used technology which shows potential for use in gene therapy. However, even in yeast gene replacement does not always result in an expected genetic event (replacement of targeted by transforming DNA). A number of aberrant genetic events can occur. One of those events has recently been discovered by Svetec et al. (2007). They observed that gene replacement technology can result in a duplication of chromosome on which the targeted region is located. One of the possible explanations for this genetic event was fusion of yeast cells caused by spheroplast transformation method. In this work an alternative method of transformation, lithium acetate method, was used and it has been demonstrated that chromosome duplication during gene replacement occurs regardless of method of transformation.

61. Jelena Sučić: Application of CIR aerial photographs for the assessment of trees health status

Forest damage and health condition of trees and stands can be determined terrestrially and by using photointerpretation of colour infrared aerial photographs (CIR) . Creation of quality photointerpretation key is absolutely necessary for obtaining reliable results. A photointerpretation key for the principal tree species (oak, ash) is created based on a method of mirroring on aerial photograph, depending on the species and the damage indicators. Damage indicators (damage-O, mean damage-SO, damage index-IO, mean damage-SO1) were also calculated for each tree species, per surveying stripes, for management units, and for the entire area of the Slavir. CIR aerial photographs were interpreted on the basis of a systematic 100 x 100 m sample to obtain the mean damage status (SO,) which was 23.27% for all tree species, 30.31% for pediculate oak and 17.30% for ash. It may be concluded that the degree of damage index (IO) for Slavir management unit is 38.84% for pediculate oak and 22.32% for ash, which means that damage for pedunculate oak is more than 25% in the surveyed area. After identifying forest stand condition per surveying stripe for Slavir management unit, we created thematic maps which show the environmental disposition of damage throughout the forest sections. Aerial photographs are a lasting document of forest stand condition for the existing situation. In aerial photographs observations may be repeated, checked, updated and continued at any given moment.

FIELD OF SOCIAL SCIENCES

FACULTY OF EDUCATION AND REHABILITATION SCIENCES

62. Tena Košiček, Darko Kobetić: RESEARCH OF SOME ASPECTS OF EARLY CHILDHOOD INTERVENTION

Early childhood is the most critical period in the development of every child because it is exceptionally important for gaining early experiences and for the development of the brain as a whole. The reason for stressing the importance of early action and inclusion of the child into treatment is the capability of brain tissue of children of that age to sustain its functional capacity by substituting damaged tissue with some other nerve tissue. Clinical experiences have demonstrated that early intensive stimulation of damaged areas can yield great results which are the reason for emphasizing the importance of development of early intervention in our society.

The purpose of this research was to investigate the results of modern approaches in early intervention, primarily at the territory of Zagreb, but also at some areas outside of Zagreb, and also to check the level of familiarity of young parents who are not directly affected by this problem, to see how much they know about the work of educational and rehabilitation experts and to learn if they know who to turn to if they notice deviations with their child.

A semi structured questionnaire, designed for the needs of this research and adapted for both groups of interviewees, was used with a sample of 157 parents of children with development difficulties and 200 parents of children who develop normally.

By using basic statistical parameter analysis (absolute frequency and percentages) for each question, results were obtained which point to dissatisfaction of parents of children with development difficulties with the timeliness and quality of obtaining information about possible treatments and rehabilitation of children. Parents' dissatisfaction with cooperation among experts of various fields also came out as a result.

Results of familiarity research done among parents of children who develop normally show an inadequate level of parents' awareness of the work of educational and rehabilitation experts, of the importance of early inclusion into rehabilitation treatments as well as of places where they can turn for help and advice if they notice deviations with their child.

FACULTY OF ECONOMICS AND BUSINESS

63. Dajana Cvrnje, Tihana Šmitran: Comparative analysis of venture capital in central and eastern Europe and Croatia

This paper provides data on venture capital in central and east Europe and Croatia, with special emphasis on situation of venture capital in Croatia. After short overview of general development of venture capital and its origins, situation in CEE region and Croatia are analyzed in more detailed. Various differences and similarities are presented using different measures (ability to attract capital, VC investments as percentage of GDP, index of economic freedom and combined scores). All the measures showed that Croatia lags behind all the CEE regions, but more importantly, they showed that Croatia has a major potential to develop.

64. Nikola Kleut: A TEST OF FAMA FRENCH THREE FACTOR APT MODEL ON ZAGREB STOCK EXCHANGE

CAPM which was developed by Sharpe and Lintner (1964, 1965) has proven empirically inadequate and theoretically incomplete pricing model of capital assets. Black (1972) developed an alternative equilibrium model under a set of modified (although unrealistic) assumptions. Merton (1972) sets ICAPM under a set of different assumptions than Sharpe Lintner CAPM and Black CAPM and redefines assumptions of investors goals. Fama (1996) shows how Merton's intertemporal CAPM generalizes the logic of CAPM and how prices in equilibrium imply multifactor market portfolio efficiency. Multifactor efficiency still implies the relationship between expected return and Beta coefficients but requires additional Betas along with market Beta in order to explain expected returns. Fama and French (1993) identified two additional variables, Book-to-Market ratio as value and market capitalisation as size variable. This paper is concerned with testing Fama French three factor APT model on Zagreb Stock Exchange and contrasting its results with Sharpe Lintner CAPM.

65. Iva Zorko, Dora Vuletić: Extended model of credit payment

This paper analyzes deficiencies in current methodology of APR calculation. Proposed model extends APR to include various fixed and variable costs together with opportunity costs of deposits and insurance payments. Besides APR, model includes evaluation criteria for credit approval and selection allowing debtors to select credit with the lowest available APR. Proposed model is implemented in form of computer program for credit selection.

FACULTY OF ORGANIZATION AND INFORMATICS

66. Nikola Kadoić, Matija Kopic: Theory of Microcrediting in Transitional Economies

In the early 1970s, Bangladeshi banker and economist Dr. Muhammad Yunus designed microcrediting – a socially sensitive and rightful system of fighting poverty and high unemployment rates. His Grameen Bank for the poorest of the poor in Bangladesh has so far lifted more than 3.2 million of individuals and their families out of poverty. After initial successes at home, microcredit was put into service for reducing unemployment and alleviating poverty in numerous countries throughout the world.

This paper explores specific problems that a typical transitional country (like Croatia), is likely to face, with unemployment – the source of a vast number of related problems in a transitional society – as the focal point. The authors have attempted to incorporate particularities of a transitional economy into the original microcrediting principles. As a solution to problems afflicting the domestic economy, the authors define a global microcrediting system framework on the macroeconomic level, assuming at the same time that microcrediting of socially vulnerable groups can resolve many problems of modern transitional societies. Arising from the authors' primary intention – to consider in depth the functionality of microcrediting in general transition conditions – a transitional microcrediting system has been defined in general terms, and a corresponding financial and mathematical model developed.

67. Ivan Kljaić: Klasifikacija podataka i ekstrakcija područja očiju na dvodimenzionalnim slikama ljudskih lica pomoću komparativnih objekata

FACULTY OF POLITICAL SCIENCE

68. Marija Beber: Prime-time news on HTV, Nova TV and RTL – comparative content analysis of news broadcasted in 2005 and 2006

This research project is an analysis of the content of the prime-time news on public service Croatian radio television and on two commercial televisions with the national broadcast license in Croatia – Nova TV and RTL. This paper analysis which primary topics and journalist forms are mostly represented in the news, which is their most often territorial distribution, which persons are mostly represented in the news contents and if there is an under representation due to the gender issue. The paper also gives an insight on product placement hidden in prime-time news.

69. Duje Prkut: Comparative analysis of rise and descent of right populism parties in Australia and Austria

Author will present the development of electoral systems of Austria and Australia from the first democratic elections until today and give an overview of most important political parties of both countries. Author will determine specific elements within the political and electoral system, as well as within the right populist parties themselves, which tend to facilitate their rise. Among other elements, author finds the following crucial: critical, anti-establishment rhetoric, mobilization techniques (flirting with

racism and xenophobia within the media arena sensitive to any form of intolerance of diversity), crisis of the democratic system of governance after the fall of communism and federalism. Author will also present different approaches of the political mainstream (of each country) to diminishing the power of the right populism parties.

70. Milica Vučković: Personalisation of political communication in Croatia: party leaders and electoral reporting in parliamentary elections in 2007

In the past couple of years there have been a growing number of discussions on the increased personalisation of politics. This phenomenon is taken to be particularly pronounced in established industrial democracies although many authors argue that the trend is present in new democracies as well. Drawing on the assumption that politics has been increasingly personalised, this paper examines personalisation in parliamentary elections in Croatia in 2007 whereby personalisation is conceptualised as an increased attention media devote to party leaders, presumably to the detriment of the parties as collectives, other party officials and specific issues and party platforms.

Using the content analysis method, this study analysis articles published in six dailies and weeklies throughout the period of the official election campaign. The analyses examined what was the main focus of the articles, to which extent was the attention of the newspapers directed to the party leaders and to the detriment of the parties as collectives and other party officials and finally, it investigated what was the main context in which the leaders appeared, i.e. were they mentioned primarily in relation to the context of the campaign, their political and/or private profile or party values and platforms.

The research has revealed that election campaign in 2007 was personalized primarily in a sense of the leaders' generally high visibility in the newspaper reports, but to a much lesser extent in a sense of the media interest in the specific features of their political and/or private profiles. Furthermore, the analysis has revealed that visibility of the leaders varies across parties – while Ivo Sanader emerges as convincingly the most dominant party figure that often appears as entirely autonomous actor, this is not the case with SDP's Zoran Milanović. Finally, this analysis has revealed that „horse-race“ journalism is a predominant model of the electoral coverage in Croatia which means that voters could learn a lot about the mutual verbal slapping of the two front-running candidates but very little about specific programs and policies.

FACULTY OF PHILOSOPHY

71. Kosta Bovan, Andro Pavuna: PERFECTIONISM AND METAPERFECTIONISM

According to the simplest definition perfectionism is defined as the aspiration for flawlessness, and perfectionists are people who want to be perfect in every aspect of their lives. Considering there are many theories which try to explain the concept of perfectionism, we were interested in how laity defines and experiences perfectionism. With our preliminary research we have concluded that the students of Faculty of Humanities and Social Sciences from University of Zagreb have in the same extent implicit theories that include the positive aspect of perfectionism and those that are mainly focused on the negative aspect. Considering that finding in our main research, which was conducted on 461 students from different faculties of University of Zagreb, we wanted to examine the relationship between positive and negative perfectionism and

metaperfectionism. We defined metaperfectionism as an aspect of metacognition which includes the knowledge and understanding of perfectionism as well as the ways in which one deals with its own perfectionism. The Positive and negative perfectionism scale (PNPS) was used in the research, and we also added two particles to the questionnaire on which the participants had to answer: how much they found perfectionism as being desirable and how much do they find themselves as being perfectionists. Results showed that there is a difference in the perception of desirability of perfectionism and the perception of one being perfectionist depending on the type of perfectionist the participants were. Also, moderate positive correlation was found between these two particles. We showed that only the positive perfectionism is predictive for the perception of desirability of perfectionism, and it is more predictive than the negative perfectionism for the perception of one being a perfectionist.

72. Dina Crnec: Digital heritage preservation: guidelines and recommendations

The paper discusses various issues on long term preservation of online and offline digital information and heritage. The author provides more detailed instructions on digitization, migration and preservation according to the UNESCO guidelines that concern projects especially in Croatia, as well as those in other countries in which the digital heritage preservation age is at its beginning. These specific guidelines enter a couple of important areas: determination of a time frame for evaluating if and when a document migration is necessary – changing the format in which the information is stored into an adequate one that is easily accessible; continuous obligatory, not facultative education of information experts in order to avoid waste of time, funds and finally, documents in the processes of migration and preservation of data; action on a local basis in order to develop a unique national strategy and ensure a better ground for international collaboration afterwards, bearing in mind that it is almost impossible to predict the exact course of evolution of information technologies and the «duration» of a format. Examples of the most successful digital heritage projects have been studied through and two of them have been selected, being represented briefly as role models for other countries that are about to enter the field of the preservation of data (including Croatia), and partial models for others to improve and/or change their ways of conducting projects. The author also went through a comparative analysis of the development, implementation and world wide use of today's two most popular types of media: CD and DVD, in order to get a closer insight into the time frame needed for a certain media to become standardized, and formulate a basis for UNESCO guidelines' additions for conducting projects. Finally, a conclusion arises that the best solution at the moment is following concrete guidelines and recommendations regarding this particular part of information science, as well as enabling best conditions possible to ensure quality digitisation and migration of documents, since the amount of new data is rapidly increasing daily and information technologies change constantly.

73. Ana Pongrac: MODEL FOR TEACHING QUALITY MANAGEMENT AT THE COURSE LEVEL

This paper presents quality assurance systems used in the countries of the world and Europe and presents processes for internal and external quality assurance in institutions of higher education. The analysis of existing systems for control of the quality of teaching, it has been found that all observed the quality of teaching only to the course level. The central part of this paper presents developed model for quality management at

the course level that is based on continuous assessment during semester. Evaluation is conducted at the level of individual teaching topic using on-line questionnaire. The model presents a way of statistical analysis of the results obtained by evaluation of teaching quality. This has enabled improvement in teaching practices within each individual teaching topic, as well as the improvement of the entire course. Based on the model presented in this paper researchers created on-line quality management system.

74. Sara Prot, Adrijana Banožić, Martina Udovičić: Academic stress and risk behaviors of students

The goal of this study was to explore the relationship between risk behaviors of college students and academic stress. A questionnaire was given to a sample of N = 442 male and female students from the University of Zagreb. Most of the students are satisfied with their experiences in college (64%) and see college as somewhat stressful (87%). Students rated taking exams and taxing schedules as the main sources of stress in college.

The expected correlation between academic stress and risk behaviors was found only for female students. For women greater perceived academic stress was linked with 2 rare but dangerous risk behaviors – use of tranquillisers ($r = 0.18, p < 0.01$) and starving oneself ($r = 0.15, p < 0.01$). Academic stress was negatively linked with satisfaction with college both for male and for female students ($r = - 0.42, p < 0.01$).

Since this was a correlation study it is not possible to establish causal links between academic stress and students' risk behavior. However, since significant correlations have been found between academic stress and 3 serious and possibly fatal risk behaviors, we think this issue merits further attention.

FACULTY OF LAW

75. Marko Bratković: Dissolution of Marriage in Roman, Canon and modern Croatian family law

Marriage and different ways of dissolutions of marriage have differed in various chronotopes of its legal articulations due to the factual state of the society in which they were shaped. Their complexity prevented all theoretical concepts from comprehending their true essence. Classical Roman law basically supported the idea of liberal marriage, but the infiltration of Christian moral thought in all pores of social life was reflected in the divorce regulation and therefore the divorces sine iusta causa were viciously punished in the Post-Classical Era. Although the Church upholds the fact that the hard and consummated marriage is indissoluble because that can save the marriage and in that way prove useful for the spouses, their children and the community, in specially prescribed circumstances marriage can also be dissolved into forgiveness for an “unaccomplished marriage”, Pauline privilege and vicarious power of the Roman Pontiff. Moreover, the Church allows the separation of the spouses in extremely severe cases but only if accompanied by insisting reconciliation attempts. Although the teaching of the Roman Pontiff on the absolute indissolubility of the hard and consummated marriage does not have a dogmatic character, it has strongly affected the slow penetration of the classical Roman idea of liberal marriage into the civil law systems of countries that were under influence of the Catholic Church until the seventh decade of the 20th century. The resurrected idea on marriage liberality derived from the

rationalistic philosophy of the 18th century managed to somewhat reduce the meaning of marriage as a haven which will provide lifelong economic security and social status, since for many people a sufficient amount of emotional and economic security can be accomplished in cohabitations. It is completely clear that in real life circumstances marriage duration cannot be ensured by law-regulated inability to dissolve it or by coerced maintaining of a loveless marriage. Therefore, in modern Croatian family law all the causes are broadly classified as a disruption of matrimonial relationship and collaborative divorce is considered to be a fully legitimate way for dissolution of marriage.

76. Vedran Ceranić: The judicial activism and the constitutional jurisprudence: political implications in comparative perspectives

Paper called „The judicial activism and the constitutional jurisprudence: political implications in comparative perspectives” represents a student’s attempt to analyze very interesting and complicated issue of law and politics relations. This paper wishes to answer two basic questions which are posted like a problem. The first problem occurred immediately after the constitutional jurisprudence was implemented in legal and political life of the United States of America with historic ruling of the Supreme Court in the case of Marbury vs. Madison. The critics of this verdict emphasized that with this kind of activity the Supreme Court violated the principle of separation of powers and completely exceeded into the political sphere. Therefore, we wondered if it was true that judicial activism must produce complications which will inevitably occur in the regular legislative process. The second problem is related to the level of development of the judicial activism in the Republic of Croatia. After the Introduction the paper analyses fundamental terms so that later we can analyze the political questions doctrine which is used to accomplish a balance between normal proceedings of legislative life and with constitutional guaranteed functions of the constitutional courts in protection of the constitutionality and legality. The case study begins in the second part of the paper. After analyzing Marbury vs. Madison case, we analyze verdicts from the area of racial discrimination, death penalty and famous Bush vs. Gore case. By analyzing judicial activism in the Federal Republic of Germany we try to demonstrate that judicial activism, although originated in the area of Anglo-Saxon legal influence, is not and must not be foreign to the legal practice of the continental Europe. The verdicts that are analyzed are related to the question of the territorial organization of the Federal Republic of Germany, election law in the revolutionary 1990, election law of the foreigners in the Germany and the relations between Basic Law and the religious communities. With this concludes the overview of the judicial activism in the renowned democracies with developed constitutional jurisprudence. After that, the subject of our analysis is the judicial activism in the Republic of Croatia. The verdicts that are being analyzed are related to the usage of the principle of proportionality, relations between Church and state, the diasporas’ election law and one other case of the self-restraint of the Constitutional Court of the Republic of Croatia by which it upheld a very questionable practice. In the Conclusion we recapitulate this data and try to answer previously posted questions. This paper tried to emphasize the importance of judicial activism for setting up legal security, but always paying attention that the parliament as the exponent of the legislative activities is not exceedingly restrained. Consequently, we emphasized several times that judicial activism in the Republic of Croatia is unfortunately very young and undeveloped. Also, this work tried to emphasize the importance of the constitutional courts in achieving the principle of constitutionality,

legality and the rule of law as the highest constitutional and philosophical ideals of modern liberal-democratic states.

77. Iva Dobrić: Izvanbračni drug kao zakonski nasljednik

Social changes that took place in the second half of the 20th century resulted in need for legal regulation of cohabitation in multiple legal disciplines, including hereditary law. Cohabitants were first included in the category of legal successors in 2003. Although cohabitants and married couples are equal in their right to inherit by law, that particular field still contains vagueness's and doesn't guarantee enough legal security to people who choose cohabitation over marriage. As to get a complete insight into the current legal regulation, this paper analyzes the specifics of legal succession in general and that of cohabitants. For a better understanding of the current state a short comparative study of chosen European countries has been conducted.

78. Daria Dubajić, Romea Manojlović: Harmonisation of local self-government in Croatia, Italy and Slovenia

This paper deals with local self-government in three neighbour, but in many aspects very different European states, Republic of Croatia, Republic of Italy and Republic of Slovenia. After a short foreword, the components of local self-government system will be theoretically explained: territorial organisation and its fundamental dilemmas; local competences and the principles of their determination; definition, goal and forms of personal citizens' participation in local competences; forms and competences of the local bodies; theoretical models, sources and forms of financing the local self-government and the central -local relationships according to the supervision of higher level of local self-government or central state over local bylaws and local bodies. In the third part of this paper, constitutional and legal forms of arranging these components in Croatia, Italy and Slovenia are being presented. The conclusion of this paper answers to the title question whether there appears, and if it does, in what degree, some harmonisation of local-self government between these three states and would it be possible and appropriate for Croatia, considering the actual situation and problems in her local self-government, to adopt some Italian or Slovenian experiences in this field.

79. Ana Miljenović: Population needs assessment of the area under special state care: county Donji Kukuruzari, Hrvatska Dubica, Majur and the city Hrvatska Kostajnica

Paper deals with needs assessment of the residents in the area under special state care: county Donji Kukuruzari, Hrvatska Dubica, Majur and the city Hrvatska Kostajnica. The purpose of the research was to establish ground for further actions in community. The examinees were high school pupils, residents who have 18 to 65 years, and employers with the community relevant function. Results show that the most stressed needs are in economic aspect with the high rate of unemployed residents, pshychological, and educational area, while the important resources safe family area and developed institution net can give important contribution.

80. Tin Oraić: On justification of abrogation of the upper age limit as an active adoptive assumption

The purpose of the paper is to point out the possible consequences of the novel of the Family Act by which the upper age limit of an adoptee and the upper age difference between an adoptee and an adopted person are abrogated as assumptions for adoption. The author provides an insight into the general historical development of the institute of adoption and the one on Croatian legal area, emphasizing the last twenty years and focusing primarily on the age as an assumption for adoption. The central point is that, if nothing else, the time for this legislative action has not yet come considering the reality with regard to the institute of adoption and that it encourages the disruption of the principle *adoptio naturam imitatur*, but also the contemporary principle of the best interest of the child in favour of potential adoptees. That point of view is additionally substantiated with the analyses of the comparative law situation and relevant legal acts of international law, which brings us to a conclusion that the legal status before the novel was entirely adequate.

81. Ivan Turković, Nikola Vido, Matija Vučko: The Satisfaction of Housing Quality among Tenants of POS and Tenants of Settlements nearby

The Program of Socially Encouraged Construction (POS) is being performed in Croatia since the Law of Socially Encourage Construction was acquired. Programs value is emphasizing the problem of housing in the public agenda, and construction of apartments with advanced determined prices and convenient terms of credit financing. The sample was consisted of tenants who live in POS settlements and those who live in settlements nearby. The total number was 192 tenants (N=192), from that 96 examinees were tenants of POS settlements, and the other 96 participants from settlements nearby POS. The aim of this research was to discover differences in a quality of housing according to the type of the village. The quality of housing was measured through: satisfaction with the quality of the settlements, satisfaction with the quality of the living space, satisfaction with the quality of public contents and social and economic features. The results of the statistic analysis have shown that there aren't any differences between tenants of POS settlements and settlements nearby.

The results have been discussed with the view of the future research studies of social aspects of housing and estimation of housing needs. According to the fact that the systematic procedure of housing programs is not being performed, it is necessary to measure their efficiency.

FIELD OF HUMAN SCIENCES

FACULTY OF PHILOSOPHY

82. Zvezdana Balić, Marijana Dimkov, Franka Gulin: SMS naš svagdašnji – jezična, dijalektološka i stilistička analiza SMS-poruka

The framework of this project is the analysis of SMS messages on linguistic, dialectic and stylistic level. Since this phenomenon of modern communication does not have that much of bibliography, this research and analysis are based on the corpus of SMS messages collected during one year, and the knowledge adopted in the classes of Hrvatski standardni jezika (by prof. Bernardina Petrović and Ivo Pranjković), Hrvatska dijalektologija (by prof. Mira Menac-Mihalić), Figure i diskurzi and Stilistika (by prof.

Krešimir Bagić). During the former academic year (2006./07.) in the class of Morfologija hrvatskog standardnog jezika, which is a part of the Katedra za hrvatski standardni jezik, the project of morphological characteristics of SMS messages came to realization with mutual forces. That project was the beginning point for one-year research which involved dialectic, stylistic and whole linguistic analysis. This research begins with a short reference of the phenomenon of mobile communication. Then follows the analysis of each message of the corpus and the end, the summary of linguistic, dialectal and stylistic characteristics, and interesting appearances in language. In addition to research, there are two anonymous polls which were opened on some Croatian Internet forums and the answers of the participants were very interesting, and they confirm some thesis of this project. Another addition is more than a 100 messages which are in the corpus but did not directly enter the research.

83. Maja Banožić: Zdenka Marković: ženski glas hrvatske književne historiografije

The work refers to scientific research of the author Zdenka Marković entitled Early Modern Women Poets of Dubrovnik (Pjesnikinje starog Dubrovnika) (1970), the first comprehensive Croatian literary historiographic survey written by a woman. Special attention is given to the fact that the “weaker” “female” subject is present not only in fiction but also in literary historiography. The aforementioned work is analysed in the context of studying gender oppositions, identity construction and historiography as a “male” discourse. Even though the work by Marković represents a detailed survey of women poets of Dubrovnik who were marginalized at the time since it is based on elaborate archive research, it is also a visible locale of self-realization of the female authorial voice.

84. Lidija Bencetić: Rezolucija Informbiroa – percepcija hrvatske javnosti na primjeru regionalnih novena

Text examines the public opinion in the People's republic of Croatia after publishing of the Information Bureau Resolution and expulsion of Yugoslavia from the Information Bureau, by trying to show the measure in which public opinion influenced the writing of regional newspapers (Glas Istre, Glas Slavonije, Slobodna Dalmacija and Vjesnik) to determine the extent to which these newspapers were independent in their work or guided from the center of power of Belgrade.

85. Petra Glavor, Iva Milićević, Ivana Vilović: Rekonstrukcija fragmentarno sačuvane Držićeve drame “Pjerin”

Project Pjerin is a reconstruction of a partially saved Držić's play. The comedy Pjerin, which was written in 16th, was lost, and until today a few dozen sentences were saved. Those sentences were written by Dum Đuro Matijašević in 18th century. Mr. Pero Budmani made a fabula reconstruction of the play, in Croatian standard language, based on those sentences, in 1902. Until today no one has completed it, or made a whole reconstruction of Držić's Pjerin, so we decided to do that work thoroughly. We studied and researched Držić's language, from phonology, morphology, across syntax and lexicology, and finally stylistic specifics. Furthermore, we researched and studied, socially-cultural and political frames, which were embroidered through language at Dubrovnik in 16th century. We tried to revive and show just roughcast characters from Držić's Pjerin as best as we could, using saved

Držić's characters and situations in play. We paid attention to smallest details, as were for example differences between speech of Dubrovnik's aristocrats and plain people, using Petrarcistic elements by which the rest of Držić's plays were embroidered, playing with words trying to accomplish authentic Držić's speech. We reconstructed the comedy *Pjerin* by whole, and wrote all replicas, and did it in Dubrovnik's idiom of 16th century, furthermore, in Držić's idiolect.

86. Krunoslav Lučić: Epistemological and narratological foundations of Plato's dialog philosophy An essay on Plato's Symposium

The paper explores the issue of Plato's unwritten philosophy extrapolated from the hermeneutic task of interpretation of the written part of his work, with special focus on the dialog *Symposium*. In spite of many exegeses which support the thesis of possible extrapolation of Plato's overall philosophical system from his written work, the author approaches the problem from a different perspective - on the foundations of the so-called "Tübingen Plato", which link Plato's philosophy and methodology of dialog to the way and organization of discursive content in a narrative philosophical dispute. The thesis is supported by the analyses of complex dramatic and narrative techniques that function as structural principles of the dialog, which simultaneously has distinctive repercussions on forming and distributing cognitively relevant philosophical content. In this way, narrativity and rationality as inseparable epistemological concepts relate to metanarrative framing of the extradiegetic narrator, to unreliability of the given but highly relevant information. In addition, they are connected to the effect exerted on different instances of the addressee in communication-oriented message, whether we are considering a written, spoken, fictional or non-fictional communication situation. What is more, the situation problematically transgresses the set frame of narrative execution, for example in the dialog *Symposium*.

The paper also discusses the aspect of everyday narration as a basis for fictionalization, which provides a model of unmediated spoken execution used to define the written philosophy. In this context, the paper also elaborates the question of evaluation of one's own story by each of the narrators in the dialog. The closing chapters of the paper analyze the strategies used to evaluate the philosophically relevant stories and the effect which they have on the participants in the communication situation. When the complex mechanism of narration of a text is taken into account, it includes accepting different levels of responsibility for the given utterance in the constitution of narrative identity through different intertextual praxis of particular instances of narration which are implicitly or explicitly responsible for speaking or writing in order to achieve a specific cognitive effect. This relationship between the epistemological and the narratological aspect of Plato's dialog reveals itself as a crucial concept for understanding and contextualizing his historically and culturally specific philosophy.

87. Goran Mihelčić: Machiavelli's political thought and classical republicanism: perspectives and controversies

Scholars loosely affiliated with the Anglo-American school of the history of political languages (J.G.A. Pocock, Quentin Skinner) accentuate the role of Machiavelli's political thought in theories of classical republicanism and civic humanism. They link Machiavelli's concepts of virtue, class equilibrium and liberty with both the works of classical authors like Aristotle, Polybius and Cicero, and 17th century English authors like James Harrington. Their interpretative model creates a republican tradition over two

millennia old. This paper proceeds to challenge their interpretative model by questioning the validity of the so called concept of classical republicanism, by determining Machiavelli's intentions and by reexamining the role ascribed to Harrington by Pocock and other historians in creation of modern Anglo-American republican thought.

88. Mario Sluga: Skepticism on Film: a Cavellian Reading of "Alien" and "Blade Runner"

In this paper, *Skepticism on film: A Cavellian reading of 'Alien' and 'Blade Runner'*, I present an application of Stanley Cavell's ideas, such as human reaction to horror and (in)human reaction to one's doubts about the humanity of the other, to film, in particular to *Alien* and *Blade Runner*. In both cases, I present a novel reading of the film, differing substantially from Mulhall's readings as described in *On film*, drawing also from Toril Moi's understanding of theatricalization presented in Henrik Ibsen and the birth of Modernism.

Analyzing the whole of the *Alien* narrative as Ripley's nightmare and pointing out the importance of not conflating the two disparate entities in the alien's life cycle (the impregnator as opposed to the grown form) into one, I focus on the horror of incommunicability and the horror of not knowing the other as well as not knowing one's own body. Ash character provides a logical and natural bridge to the reading of *Blade Runner*. In it, I explore key Cavellian concepts of acknowledgement and intervention i.e. how the problem of the other minds has mistakenly been taken for an epistemological issue instead of what it really is; a question of ethics. I discuss the relationship between Rachel and Deckard, she learning how to give voice to her own passions and he how to give voice to her; explain why Rachel intervenes on Deckard's behalf; show on Pris' example how theatricalization leads to tragedy; shed light on Batty's quest for accepting oneself as mortal and his choice to save Deckard; and finally, deal with the implications of the director's cut which suggests Deckard is a replicant.

89. Hrvoje Tutek: Communication as cognition – on the literary procedures of Petar Šegedin

The article «Communication as cognition – on the literary procedures of Petar Šegedin» analyzes narrative strategies in the novel starting from the assumption that it is necessary to recognize the ethical and political implications of the way the novel is organized. Since the novel was created by linking a series of previously published short stories binded together by subsequently added text, many questions arise about the possibilities of authorial intervention, boundaries of literary text, openness of the signifier to cumulation of semantic content, and communication between texts we recognize as separate. The peculiar structure of the novel reflected in both its microstructural and macrostructural units openly invites the reader to participate in the process of production of meaning, thus showing it is conscious of its dependence on him/her. This raises questions about the border between literature and reality, about mutual relations of participants in the communication process and their responsibility for it, as well as questions about the possibility of creating a democratic system of production of meaning whose final goal is (self)consciousness of the subjects involved in its creation. By analyzing and theoretically elaborating the concepts of frame and, especially, dialogue, which are recognized as the key concepts for the reading of Šegedin's novel, the article tries to interpret the text's openness to reader participation which results in the construction of a characteristic mechanism of production of

meaning, the dialogic process, as a practice that implies the equality of participants and, when established, offers them a possibility of change, self-cognition and self-creation.

CROATIAN STUDIES

90. Irena Jerković, Latica Mirjanić, Antonija Peroš: Predictability of depression based on adult attachment and sex role

Previous research has demonstrated strong links between adult attachment style and depression along with sex role and depression, even though it is still not clear which aspects of insecure attachment style predict depression, as well as the importance of masculinity and femininity as predictors of depression. This survey emphasized insecure attachment because of its previous correlations with psychological distress. First part of this survey has determined metric characteristics of the Adult Attachment Questionnaire (ECR-R), after translating it into Croatian. The translated inventory confirmed the theoretical expectations based on Fraley's (2005) previous work. Second part of this survey tested the ability of insecure attachment and Bem sex roles (BSRI) to predict depressive symptoms (ZDI) in clinical population. Anxious attachment style, avoidant attachment style, masculinity and femininity accounted for 28,9% of the criterion variance. After examining the individual contribution, only masculinity and anxious attachment style predicted depressive symptomatology. Greater depression is connected with low masculinity scores and high prominence of anxious attachment style. The results were discussed in terms of masculinity model. These findings highlight the importance of masculinity and anxious attachment style in developing depressive symptoms.

CATHOLIC FACULTY OF THEOLOGY

91. Stipe Odak: In the beginning was... what? (Reflections on Hermeneutics and Need of special Approach in Interpretation of Bible)

The following work is explorative research. Taking into account various philosophical, theological, literary theoretical and philological resources, a short review of the development of hermeneutics is presented. At the same time, it deals with the problem of unity or diversity of hermeneutics as science. Similarities and differences with cognate notions such as: meaning, interpretation, exegesis and sense are described. These notions are also separately described. In the process, a special attention is given to the practice of interpretation. Special emphasis is given to biblical hermeneutics – its development, peculiarities and contemporary guidelines which are connected to the special way of biblical and believer's comprehension of Scripture. The work tries to explain the problems of discussions on hermeneutics and interpretation up to date and tries to offer a concise synthesis and propose new solutions.

FIELD OF ART

ACADEMY OF DRAMATIC ART

92. **Martin Birač, Antonio Gabelić:** za kratkometražni igrani film “Reciklus” (Odsjek produkcije, Odsjek dramaturgije)
93. **Goran Ferčec:** za osvojenu međunarodnu nagradu za dramsko djelo “Govoriti o granicama” (Odsjek dramaturgije)
94. **Anja Maksić:** za režiranje dramske predstave “Lutkina kuća – Zmija mladoženja” (Odsjek kazališne režije i radiofonije)

ACADEMY OF FINE ARTS

95. **Livio Rajh: Virtuality, interactive observer, perspective/space, meta-exhibit**

The work consists of one computer graphic, digital print - size 84 x 42 cm and one virtual projection that makes interaction with the observer possible. The three-dimensional simulation of reality which offers one gallery exhibition of paintings by Pavle Pavlovic looks convincing on projection. Digital print imposes a secondary motif; observers (line drawing) in the defined simulation/space also seem believable. These observers function in their own perspective. The tie between the two is the furniture set in tune with the spherical projection of the gallery but presented as a line drawing (same as the observers). Interactive observer watches this work in the gallery and in it notices some visitors in some gallery: one meta-exhibit is on display.

96. **Lea Vidaković: Interior of a Heart**

“Interior of a Heart” is an installation, represented as a cluster of personal achievements, not only as visual artworks, but also those objects and recollections from everyday life, which are entirely individual, and therefore deprived of any aim to be regarded as works of art.

Aesthetic ideals are mixing here with those of fully intimate and sentimental nature. Interweaving this abundance is acquired by a complex but chaotic, upside down structure, alike those ‘inner gardens’ which we are nourishing in our selves - dealing with a problem of piercing in a field of the hidden and confident, in a sphere of the deeply guarded intimacy.

Such a cumulus is a result of feverish, stratified concourse, setting and resetting the (un)necessary, keeping almost everything ever retrieved. The fever of collecting, and an element of fear, fear of loss, is the coordinators of a conscience, which is therefore corrupted, blocked, as obstruction of sober thinking and recognition of real values.

ACADEMY OF MUSIC

97. **Domagoj Dorotić** (tenor): za ulogu Rinuccija u operi “Gianni Schicchi” G. Puccinija, Hrvatsko narodno kazalište u Zagrebu
98. **Nina Jukić (musicology): Music-iconographical analysis of Ivan Ranger’s music-making angels in St. Jerome Church, Štrigova**

St. Jerome Church in Štrigova was painted with frescoes by Ivan Krstitelj Ranger in 1744. Among other pictures, Ranger here also depicted three music-making angels: two trumpet players and one timpani player. Their role in the iconographical program of the church is very interesting, since trumpets and timpani were in history used to

accompany ceremonies and military campaigns. In Štrigova they lend solemnity to the triumphant parade of St. Jerome on the tambour carrying a dome. Considering the features of the pictured instruments, it is possible to imagine how the music of these angels could sound like. Music iconography is a branch of musicology that deals with the analysis and interpretation of musical subject matter in works of art. In Croatia, music iconography is almost an unknown field. Since Koraljka Kos published a comprehensive study on the music instruments in the Croatian medieval art, no one has systematically dealt with the problem of music iconography in Croatia. This study is just a small contribution to this still considerably unexplored area between art history and musicology.

99. **Nikola Kos, Robert Batelić** (klavirski duo): za koncert održan 8. travnja 2008. u Ljubljani

100. **Zita Varga** (violončelo): za recital na festivalu Sommets Musicaux u Gstaadu, Švicarska, 5. veljače 2008.