



STRATEGIC PLAN FOR SCIENTIFIC DEVELOPMENT 2017-2022



Zagreb, December 2016

UNIVERSITY OF ZAGREB
FACULTY OF KINESIOLOGY

**STRATEGIC PLAN
FOR SCIENTIFIC DEVELOPMENT
2017-2022**

*„However beautiful the strategy, you
should occasionally look at the results.“*

Sir Winston Churchill

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1. EUROPE 2020 STRATEGY

The European strategy for investing in science and development indicates the target of 3% of GDP invested in research and development, as well as the aim of the public private sector investing in research and development together with the state. The measures proposed in the Europe 2020 strategy are particularly directed towards private sector investments in all segments which are required for the development of scientific and research activities. Social progress must be based on innovations resulting from scientific activity and therefore established on scientific knowledge. In order for anything of the above-mentioned to be accomplished, it is of essential importance to provide the required investments in education, especially investments in doctoral studies when it comes to science, in order to enable an easier transfer of knowledge from science to development of new technologies, but also products and services.

The White Book on Sport, the first European comprehensive document on sport, confirms the importance of sport for business and social development, however also in the everyday life of each citizen. In addition, a critical lack of physical activity is also identified resulting in excess weight, obesity and chronic disease, all of which reduce the quality of life. In order to successfully stimulate and implement the national programs that promote physical activity, cooperation is needed between state institutions and private subjects, as well as on the level of state ministries between the departments of health, education and sport, whereas the role of science is unquestionable. Sport plays an important role both in formal and informal education through strengthening of human capital in terms of stimulating personal growth, motivation, knowledge and personal commitment. The role of sport and recreation in society is also demonstrated in prevention of violence, racism and any other form of violence, not only in sport arenas, but in all public and private places, as well as in encouraging volunteering and active citizenship and promoting the importance of awareness on environmentally sustainable management. Equally important, however occasionally overlooked, is the business dimension of sport. According to the study presented during the Austrian presidency, in 2004 sport created an added value of 407 billion euros, which was 3,7% of the EU's GDP and thereby ensured employment for 15 million people. The synergy between tourism and sport (recreation) can constitute as the originator of regional, rural and local development, while there is also an increasing function of the connection between sport and intellectual property (copyrights, commercial communication, trademarks, media rights, user rights on images). The politics of sport must be based on evidence (apparent role of science) and therefore, a European statistical method for measuring the impact of sport needs to be developed in cooperation with government and non-government stakeholders.

According to the new EU Framework Programme for Research and Innovation 2014-2020, Horizon 2020, there are three main priorities: excellent science (i.e. scientific excellence), industrial leadership and tackling societal challenges. With regard to the previous scientific and research field of activity of the Faculty, future research guidelines would be directed towards excellent science and tackling societal challenges. Societal challenges are categorised into seven priorities: health; demographic change and wellbeing; food security; sustainable agriculture and forestry; marine, maritime and inland water research and the bioeconomy; secure, clean and efficient energy; smart, green and integrated transport; climate action, environment, resource efficiency and raw materials; inclusive, innovative and reflective societies. Engaging in physical activity is beneficial for each individual (health and psychological benefits), however also for society as a whole (socialisation, improvement of social skills, prevention of drug abuse and adolescent delinquency, building of better relations between different age groups, economic and ecological benefits).

In addition to tackling societal challenges, The Faculty can also focus on the area of excellent science with regard to: collaborative scientific projects; creating a communication network of excellent scientists through formal and informal channels; organising and participating in scientific conferences; incoming and outgoing mobility of scientists; acquiring and ensuring the use of scientific infrastructure that will allow scientists to generate excellent science.

2. STRATEGY FOR EDUCATION, SCIENCE AND TECHNOLOGY OF THE REPUBLIC OF CROATIA

The strategy for the field of science in the Republic of Croatia is included in the Strategy for Education, Science and Technology. The objectives designated in the section of the mentioned strategy that refers to the fields of **science and technology** are internationally competitive public universities and public scientific institutes, as well as higher investments in research and development through improvement of the system of public financing and by stimulating investments of the business and social sector in research and development. Special emphasis is put on research, as well as innovation and education, with the goal of arriving at 3% of GDP investment in science. Naturally, particular mention is made in view of ensuring purposeful spending of money that will provide benefits for all citizens in the Republic of Croatia. Science is recognized as a national priority with fundamental postulates identifying objectives such as prompt initiating of changes, creating internationally competitive institutions and conditions for motivating collaboration of the scientific community with the economy and other social factors, smart specialisation and connecting with business activities to achieve international competitiveness, developing a national, however also engaging in the European research infrastructure. Among other goals are also increasing the scientific quality level of teachers, redefining mechanisms for determining the structure of working hours and assignments of teachers in higher education due to the significant increase in teaching and administrative obligations after the implementation of the Bologna process in higher education.

2.1. Strategy for research and transfer of technology and innovation of the University of Zagreb

The main strategic goals of the Strategy for research and transfer of technology and innovation are to stimulate scientific excellence, innovation, collaboration and the multidisciplinary approach towards research in various fields and technologies, including the humanities and social sciences, as well as art, to ensure long-term recognition of the University of Zagreb in the European framework and to contribute to the sustainable development of the overall Croatian economy and society. The immediate objective of the University of Zagreb is to reinforce the research profile and recognition of the University, for which the realisation is planned through University grants for excellent scientists and research teams in the form of research infrastructure, then by encouraging training and specialisation in acknowledged international institutions and participation in international projects, promoting

sustainable development, innovation and transfer of knowledge towards the industry, as well as by stimulating the development of a humane and tolerant society which requires providing an efficient organisational infrastructure at the University, establishing an effective system of planning and managing scientific projects and capacities, and an efficient collection and exchange of information.

3. FACULTY OF KINESIOLOGY UNIVERSITY OF ZAGREB

The Faculty of Kinesiology was established in 1959 as the College for Physical Culture. In 1973 it was renamed into the Faculty of Physical Culture, whereas it was finally renamed into the Faculty of Kinesiology University of Zagreb in 2001. The Faculty has been operating for 54 years as an independent higher education institution in the Republic of Croatia which educates teachers and masters of kinesiology for teaching physical education in the school system, as well as masters of kinesiology in the chosen field of applied kinesiology (sport, kinesitherapy or recreation). In addition to undergraduate and graduate higher education programmes, the Faculty also organises and implements a postgraduate doctoral study and specialist postgraduate studies. There is also the Coach Education Study Centre which is operating within the Faculty of Kinesiology and providing education for coaches in the field of sport, sport recreation, physical conditioning and fitness. All the studies are compatible with European university study programmes of comparable higher education institutions and are organized according to the principles of the Bologna Declaration and the European Credit Transfer and Accreditation System. The Faculty of Kinesiology in Zagreb is a higher education institution where in addition to educational activities there are also scientific and research activities implemented in the field of kinesiology at the University of Zagreb. The Faculty's primary objectives are to achieve scientific results which are relevant on an international level and to provide scientific postgraduate education on a high level through its doctoral study.

The basic organisational units which enable the implementation of scientific and research work are organised as part of the **INSTITUTE OF KINESIOLOGY**. The main purpose of the Institute of Kinesiology (hereinafter: Institute) is scientific research and transfer of knowledge for the purpose of improving the overall scientific, teaching and professional activity in the scientific field of kinesiology and its related scientific branches and disciplines. All Faculty scientist, teachers, associates and research assistants, as well as all external associates are members of the Institute.

Within the Institute, the following **smaller organisational units** are organised:

I The Centre for Scientific Research within which basic, applied and developmental research are directly conducted, and which consists of the following separate research laboratories:

1. Laboratory for Motor Control and Performance

The Laboratory for Motor Control and Performance stretches over 85 m² of modern designed space which is modified for studying the neuromechanics of human movement. The Laboratory is equipped with contemporary research systems for measuring human neuromuscular functions and motor control: (i) 3-component platform for measuring force (AMTI), (ii) 2 isometric dynamometers for lower extremities, (iii) isokinetic dynamometer (BIODEX SYSTEM 4), (iv) 16-channel telemetry EMG system (DELSYS), (v) 4-channel neuromuscular stimulator (EMF-FURLAN) and (vi) 2 digital goniometers (BIOMETRIC). Currently there are two lines of research conducted by the Laboratory: (1) acute and chronic effects of applying external load on human neuromuscular function and motor control, and (2) effects of aging and musculoskeletal disorders/pain syndromes on human neuromuscular function and motor control. The scientists in this Laboratory have until now successfully guided five PhD graduates and there are several PhD students who are currently also conducting their research. The results of the implemented research are published in prestigious international scientific journals with high impact factors.

The Laboratory for Motor Control and Performance closely collaborates with the following international scientists and/or research teams: Department of Kinesiology and Applied Physiology, University of Delaware, USA; University of Primorska, Koper, Slovenia; Department of Kinesiology, Pen State University, USA; Faculty of Sport and Physical Education, University of Belgrade, Serbia; Institute of Sport, France and Faculty of Sport, University of Ljubljana, Slovenia.

2. Laboratory for Water Sports

The Laboratory for Water Sports operates as part of the Chair of Water Sports at the Faculty of Kinesiology University of Zagreb. The facility and the equipment of the Laboratory are also used as part of regular classes in the course Swimming and Water Sports, as well as for the elective module – Swimming and elective course – Diving. In addition, the equipment of this Laboratory is also used for scientific research in the field of water sports. Part of the equipment is for testing in water, while the other part is used for testing outside the water. Diagnostics for athletes is

closely related with other segments of the Sports Diagnostic Centre of the Faculty of Kinesiology, so therefore, in case diagnostics including measurements of oxygen consumption or maximum oxygen consumption is required, then one of the air analysis devices is used as part of other units of the Institute. The Laboratory and all the equipment are in function of both scientific research, as well as of master and doctor theses and numerous diploma papers of full-time students of the Faculty of Kinesiology. If necessary, close collaboration is established between the Laboratory and Swimming clubs in relation to organising presentations, workshops or seminars. Almost all scientific papers published in the field of applied science in swimming over the last 5 years performed measurements in collaboration with the Laboratory for Water Sports. The facility and equipment of the Laboratory are also used as part of the teaching process and research conducted at the Coach Education Study Centre of the Faculty of Kinesiology. The equipment which is used covers a large portion of basic and specific tests in the field of water sports and it includes the following: swim ergometer (Biokinetic), dynamometry, underwater cameras, software for training programmes and biomechanical analysis, determining the lactate curve (pace mat, lactate and pulse meters), equipment for training programmes (pulse meters, pace-making instruments, fins, snorkels, buoys, etc.)

3. Laboratory for Biomechanics

Biomechanical methodology is basically the study and understanding of human movement, in the manner in which it is approached within kinesiology and sport science. For that purpose, we first of all measure space (3D) kinematics, ground reaction and multi-channel surface electromyography (EMG), in addition to processing and analysis of resulting signals. Apart from basic measuring instruments: automatic 3D kinematic measuring system with 8 cameras ELITE-BTS, piezoelectric measuring platform KISTLER and 8-channel telemetric surface electromyography TELEMGBTS (computer supported), we also have the 4-channel portable EMG machine MEGA, the pedobarograph ZEBRIS, the kinematic sensor KINECT, as well as some instruments of virtual reality technology (virtual reality-VR), such as the OCULUS RIFT helmet. The Laboratory is located in a 15 x 15 m room, with the possibility for expansion by lifting a moveable wall. The type of movements that are measured, analysed and, in certain circumstances, diagnosed are the following: 1) human gait analysis, where gait analysis is a method becoming more and more standardized in medical application, 2) different causes for movement that are encountered in everyday activities of humans, and 3) causes of movement in sports activities. It is also possible to approximately measure and evaluate static physical positions. The aim of the research can therefore, for instance, be the evaluation of training in a particular sports performance (on a kinematic, kinetic and/or neuromuscular

level), or perhaps muscle fatigue developed during static and dynamic physical strain. There are currently several doctoral theses that are being produced, that is conceptualised, in the field of kinesiology and computer science and the experimental part of these is conducted at the Laboratory for Biomechanics. An example of a recently conducted scientific project is: “Pedobarographic characteristics of human locomotion in sport and medicine” (for the University of Zagreb). We are members of the Centre of Excellence for Computer Vision (at the University of Zagreb) and the Coordination Committee for the Development of Biomedical Engineering at the University of Zagreb. Along with our traditional collaboration with several higher education institutions in Zagreb (Faculty of Electrical Engineering and Computing, School of Medicine, Faculty of Mechanical Engineering and Naval Architecture), we also foster a perennial collaboration with the University of Salerno in Italy and their Laboratory for Movement Analysis at the Department of Humanities, Philosophy and Education.

4. Laboratory for Sports Medicine and Exercise

a) Laboratory for Kinanthropometry

The Laboratory for Kinanthropometry has several instruments for determining body composition at its disposal, including a set of anthropometric instruments, an instrument of aerial plethysmography (BOD-POD™), as well as a bioimpedance analysis instrument for evaluating the amount of visceral adipose tissue (Tanita AB140™). Furthermore, there is one 24-hour arterial blood pressure measurement device and a one-channel 24-hour Holter EKG monitor available. The scientific equipment of the Laboratory also includes 50 multi-sensor physical activity SenseWear Core™ monitors intended for evaluating daily energy consumption, determining the duration of a physical activity of a particular intensity and assessing the quantity and quality of sleep.

The research is conducted as part of several scientific projects financed by the Ministry of Science and Education and the University of Zagreb, as well as within the IRCRO Research and Development Programme (developing a computer system for digital measurements of the human body). Moreover, research is also conducted in relation to the production of doctoral theses by doctoral students of kinesiology. The research topics studied within this Laboratory are mainly related with analysing the connection between physical activity and health, with emphasis on the nutritional status and on indicators of cardiovascular and metabolic health. The largest ongoing research of the Laboratory for Kinanthropometry is the “Croatian Physical Activity in Adolescence Longitudinal Study” (CRO-PALS), which is dealing with precisely the above-mentioned issue during the 4 years of high school education. Further,

research is also conducted on the various methods of body composition assessment with emphasis on their accuracy and preciseness in the population of athletes. In that context, in collaboration with the Faculty of Textile Technology, an accuracy comparison between the air displacement plethysmography (ADP) method and the 3D whole-body scan method has recently been completed. In addition, another research area of interest is to determine the variability of body composition in athletes, as well as its alterations under the influence of various training forms and volumes. Finally, it should be noted that many of the research conducted by the Laboratory are field measurements.

Future research of this Laboratory shall also be directed towards studying the effects of various training programmes on health, cardiovascular and metabolic diseases, as well as on body weight control and the development and treatment of obesity. The focus of interest shall also be put on evaluating the effects of intervention programmes for increasing the level of physical activity and their role in primary and secondary prevention of chronic non-communicable diseases.

b) Laboratory for Applied Physiology

The Laboratory for Applied Physiology has several ergometers for monitoring dosed loading of athletes, biochemical instruments for lactate and basic biochemical diagnostics, the *Xplorer GLX Datalogger* (PASCO Scientific, USA) interface with peripheral devices and sensors for collecting, graphically displaying, storing and analysing kinematic and temperature data, the VitalSense (Mini Mitter, OR) telemetric system for measuring core body temperature, dynamometers, as well as equipment for metabolometry measurements, that is, for analysis of gases in exhaled air, which it shares with the Diagnostics centre. The research conducted in this Laboratory are from the field of applied physiology of sports and physical exercise, whereas much of the research is conducted as part of field work in specific conditions. Some of the recent research, as well as certain ongoing projects, include studies related with oxidative stress and physical activity, biomarkers of muscle damage as a response to muscle fatigue, biomarkers of muscle damage during recovery related to applying external compression, as well as the integration of biomechanical, thermodynamic, metabolic and ventilation parameters during progressive loading. Likewise, among more recent research are also projects in the field oxygen uptake kinetics, especially in different thermal conditions, as well as studies on the effects of various forms of physical exercise on glycaemic control in diabetics. Part of the research is related to nutrition of athletes and there is also an ongoing scientific project on the polymorphisms of several genes responsible for adaptation to weight trainings and/or endurance trainings in top-level athletes and oxidative stress in football players. Certain scientists are particularly interested in research in the field

of skiing, both as a recreational activity and as a top-level sport. In view of the scope of required laboratory tests, collaborations have been established with the Genos laboratory, the Ruder Bošković Institute, the Faculty of Electrical Engineering and Computing, the Faculty of Veterinary Medicine and the Clinic for occupational and sports medicine of the City of Zagreb. In collaboration with the School of Dental Medicine, a research was conducted on the effect of L-arginine supplementation on saliva composition in active persons. The research is conducted as part of scientific projects or within research topics of master's theses and scientific papers of students at the doctoral study of kinesiology.

5. Laboratory for Psychodiagnostics

The Laboratory for psychodiagnostics operates within the Institute of Kinesiology. The activities of this Laboratory include a specified offer of psychological services in the field of psychodiagnostic and psychoeducational assessments, specializing in the field of sports.

The mentioned offer covers the following: psychological assessment and analysis of individual athletes (both children and adults); psychological analysis of sports teams, groups and/or organizations, psychological profiles of athletes/teams, group dynamics analysis, professional education and workshops for participants in sports environments, planning and implementing scientific research in the field of psychology, sports psychology and kinesiology; planning and implementing scientific projects, collection and analysis of data of various psychological variables for scientific purposes.

All the above-mentioned is carried out in collaboration with a sports psychologist with years of experience in working with many athletes in the field of psychological preparation, while applying different psychological measuring instruments and techniques for assessing psychological variables in general, but also when specifically adapted to the field of sports. The mentioned instruments are used and the overall activity of assessment is conducted in accordance with the Law on Psychological Activity and the Code of Ethics of psychological practice.

In the previous work of the Laboratory for Psychodiagnostics collaborations were established with athletes from different sports, as well as sports federations and coaches. Athletes of different age and level of quality used services of psychodiagnostic assessment both for private purposes or as part of a broader plan while preparing for competitions, starting with competitions of lower rank, international, European and World championship, and even for the Olympic Games.

6. Laboratory for Sports Games

The mentioned Laboratory covers an area of 380 m², out of which 365 m² is occupied by a sports hall for conducting measurements, while an area of 15 m² is used for immediate analysis of the obtained results and their interpretation, as well as for storing scientific and diagnostical equipment which is part of the Laboratory for Sports Games. The Laboratory is equipped with top-level diagnostical equipment, such as the OPTO JUMP SYSTEM, a measurement instrument based on optical technology. This instrument can primarily be used for diagnostics of various parameters in the performance of different jumps, such as: take-off height, duration of contact time with the surface, flight time, etc. It can also be applied for determining certain kinematic parameters in running analysis. The above-mentioned ultimately enables objective diagnostics, but also implementation of corrective kinesiological operators in function of correcting the determined misbalances and for improving the locomotor system. Considering that explosive leg strength has a considerable effect, from the aspect of motor abilities, on the equation for specification in most sports games, the mentioned instrument can also be used for the evaluation of all the parameters based on which the analysis of the desired results can be performed during the assessment of the mentioned motor ability.

In addition to the described OPTO JUMP SYSTEM, the Laboratory is also equipped with GYKO devices, produced by Microgate (Italy) as well, which combined with the above-mentioned system primarily enables determining the duration of the concentric and the eccentric phase during a certain motor movement or, by way of standardized protocols, the assessment of the degree of dynamic balance. Among the diagnostic equipment produced by the previously mentioned manufacturer, the Laboratory for Sport Games is also equipped with WITTY (SEM) systems that enable the assessment of examinees' success in basic and specific tests of agility, reactivity, speed, coordination, as well as the level of acquisition of particular motor skills in combination with the already mentioned motor abilities.

For the purpose of monitoring and determining the level of loading intensity, the Laboratory is equipped with heart rate monitors, manufactured by POLAR (M400, V800, H7), which, by way of certain programme applications and standardized protocols, have the option of both individual or group monitoring of the mentioned values. In addition, for determining the concentration of lactic acid in the blood the Laboratory is also equipped with the SCOUT+ lactate analyser. The Laboratory for Sports Games has different video cameras that enable video analysis of specific motor movements during the process of acquisition and development, however also used for determining various kinematic parameters by way of applying programme applications during the performance of a certain motor skill. Besides the previously mentioned equipment, the Laboratory has different diagnostic instruments at its

disposal enabling quite detailed and specified scientific research in basketball (SMART SENSOR BASKETBALL, DR DISH Shooting Machine). The Laboratory for Sports Games was primarily established for conducting various scientific research in the field of sports games, and therefore, several papers have until now been published in different scientific journals, whereas there are also a number of doctoral dissertations in various fields of interest that are in the process of being produced. Along with the scientific aspect, the Laboratory also is equipped for the implementation of different diagnostic procedures in the field of top-level sports. In the area of its activities, the Laboratory collaborates with other acknowledged international scientific institutions, such as: Penn State University (USA), The Norwegian School of Sport Sciences (Oslo, Norway), Comenius University, Faculty of Physical Education and Sport (Bratislava, Slovakia), Masaryk University, Faculty of Sports Studies (Brno, Czech Republic); Beijing Sport University (Beijing, China), etc. Likewise, the Laboratory also collaborates with numerous manufacturers of scientific diagnostic and sports equipment (MICROGATE, SKLZ, SAMSUNG), as well as conducts validation and testing of the mentioned equipment for their purposes. The results obtained by scientific research conducted by the Laboratory for Sports Games are acknowledged both among different domestic entities, as well as by international business subjects and national federations who demonstrated a desire for future co-funding of numerous research, primarily in function of improving people's health, but also for achieving top-level sports results.

7. Laboratory for Motor Development

The Laboratory for Motor Development was established in 2015 as part of the scientific project by the Croatian Science Foundation called "Motor skills of pre-school children". The Laboratory is equipped with measurement instruments for the assessment of motor skills of children and youngsters: "Test of Gross Motor Development 2" and "Test of Motor Proficiency 2", Omron pedometers, measurement instruments for evaluating children's development "Parents' Evaluation of Developmental Status", "Ages and Stages Questionnaire – 3rd Edition" and "Ages and Stages Socio-Emotional Development Questionnaire – 2nd Edition". In collaboration with the Diagnostics Laboratory of the Faculty of Kinesiology there are also anthropological measurements that are conducted, as well as measurements of motor skills. The Laboratory is currently implementing research directed on studying motor skills and physical activity in children, as well as interventions with the aim of improving their skills and abilities, to increase their physical activity, as well as to improve their health and reduce the risk of obesity. There are four doctoral students of kinesiology included in the work of the Laboratory, as well as eight volunteer students from the integrated undergraduate and graduate study of kinesiology. The

Laboratory for Sports Games collaborates with the Faculties of Teacher Education at the University of Zagreb and Rijeka, the Faculty of Kinesiology at the University of Split within the scientific project by the Croatian Science Foundation “Motor skills of pre-school children”, the Faculty of Education and Rehabilitation Sciences at the University of Zagreb as part of the scientific collaboration “Recognizing developmental disabilities in children of early and pre-school age”, the Croatian Medical Association within the project “Getting an A – playing towards health”, the Croatian Institute of Public Health as part of the National programme “Healthy living” and the activity “Volunteers in the park”, and with children’s nurseries in Zagreb as part of an internal professional programme “In what manner and how much do pre-school children move?”.

II Centre for Knowledge Transfer in Kinesiology within which knowledge is collected (scientific and expert resources) and is then transferred towards the end users in all fields of applied kinesiology through teaching, lifelong learning and training, conferences, publishing, scientific projects, studies, expertise, counselling, media, as well as by way of various other activities. The International Scientific Conference on Kinesiology is regularly organized, in three-year cycles, as well as other conferences in the field of sports psychology and physical exercising and health or the International Conference Physical Conditioning of Athletes. The scientific journal *Kinesiology* which is indexed in the Web of Science database is also published as part of the activities of the Centre for Knowledge Transfer in Kinesiology:

1. KINESIOLOGY – International Journal of Fundamental and Applied Kinesiology

Kinesiology is a scientific journal that publishes scientific papers in the field of general and applied kinesiology. It is indexed in most internationally cited databases such as: American Psychological Abstracts: PsycLIT and PsycINFO, EBSCO, SPORTDiscus Full Text; Focus-On: Sports Science & Medicine, Index Copernicus, SCOPUS, Sociedad Iberoamericana de Informacion Cientifica (SIIC) and Web of Science: Science Citation Index Expanded and Social Science Citation Index. Along with the Editor-in-Chief, the Editorial is composed of six assistant editors, one young editor, 46 members of the Editorial Board from 24 countries and 29 members of the Advisory Board from 17 countries. The journal was founded in 1971 and this year it will be published in its 48th volume. As of the year 2000, the journal is regularly published every two years in English, while the scientific papers are also available on Hrčak, the Portal of Croatian Scientific Journals. The first impact factor of the journal was recorded in 2011 and it was 0,525 for the year 2010. Due to the increased

number of scientific papers over the next years, the impact factor first reduced, however, then gradually increased and it was 0,553 in 2015. After appearing on the JCR lists, the journal became more visible so that the number of submitted papers started to grow exponentially. Such an increase in the number of received papers from all over the world also required more collaborations with the most prominent scholars in the field and their inclusion in the Editorial Board, as well as on the list of reviewers. In terms of increasing the level of a journal's quality, it is particularly important to develop a wide networking contact basis with reviewers from around the world, thus the selection of contacts was conducted according to the criteria of narrow specialty of reviewers for each individual topic of scientific papers. This type of work resulted in a list of some 500 world renowned scientists who enabled the highest level of quality in the selection of papers for publication over the previous five years. The list of reviewers participating in each year's evaluation process for papers has also been published in the journal since 2009.

2. International Conference on Kinesiology

The Faculty of Kinesiology has been organizing the International Conference on Kinesiology since 1997 and until today, the Conference took place seven times. This Conference is one of the most important projects of the Faculty of Kinesiology with international recognition. The fact that each year participants from over 30 world countries regularly take part in the Conferences surely is an indicator of their international recognition. In accordance with the title of the Conference, it covers a wide range of different topics in the field of kinesiology within ten separate sections in which the papers are published in the form of abstracts, as well as full texts by way of oral and poster presentations. During several previous Conferences, attempts were made to put special emphasis on certain fields by organizing satellite symposiums with special topics, particularly on health-oriented physical activity. The Conference Proceedings Book is indexed in the Conference Proceedings Citation Index database. An important segment of organization for this Conference are partnerships with international higher education institutions in the field of kinesiology, such as: Beijing Sports University, Faculty of Sport Studies Masaryk University (Brno), Lithuanian Sports University etc., as well as with the most relevant professional organizations in the field of kinesiology, such as: European College of Sport Science (ECSS), Federation Internationale d'Education Physique (FIEP), International Association for Physical Education in Higher Education (AIESEP), International Network of Sport and Health Sciences (INSHS) and others. As part of the Conference, some other important activities are also organized, such as the doctoral school for doctoral students, as well as the international Editorial Board meeting of the scientific journal Kinesiology.

III Diagnostic Centre where diagnostic procedures in all fields of applied kinesiology are conducted by using the equipment from all research laboratories, as well as with special diagnostic equipment. However, the Diagnostic Centre is for now primarily intended for assessing the level of training in top-level athletes with the aim of developing diagnostics in the population of amateur athletes.

For many years now, the Sports Diagnostic Centre has been implementing a set of procedures for measuring, assessing and evaluating the level of training in athletes. Numerous tests, that is measurements of characteristics and abilities of athletes is conducted with the aim of determining individual characteristics of athletes and controlling the effects accomplished by way of programmed training. All types of tests conducted in the Sports Diagnostic Centre are implemented under the professional guidance of kinesiologists who take into account the age, gender and level of quality of the athletes, while attempting to include an optimal number of tests for assessing various motor and functional abilities and morphological characteristics so that the tests represent high metric characteristics, as well as to meet protocol requirements, measurement conditions and data processing methods. Special emphasis is put on taking account that the collected and processed data is understandable, relevant, reliable and pragmatically valid, as well as that they clearly indicate the guidelines for future activities. The model of diagnostic procedures implemented in the Diagnostic Centre refers to morphological characteristics, motor and functional abilities, motor skills and the technical level of performance in basic movement structures. During the previous work of the Diagnostic Centre, collaborations have been established with various athletes, sports federations and coaches. The professional, up-to-date and quality work of the Diagnostic Centre has been recognized outside of Croatia and the number of athletes and teams, of various age and level of quality, who are using its services is hence increasing. Our most recent collaboration was established in October of 2014 when the Turkish Athletics National Team performed tests as part of their preparation cycle for the XXXI Olympic Games in Rio de Janeiro. The Diagnostic Centre also closely collaborates with the company COSMED in the application and correction of programme support of devices for measurement of gases in exhaled air, that is, of metabolimeters.

THE CENTRE FOR LIBRARY INFORMATION AND PUBLICATION ACTIVITIES is an organizational unit of the Faculty which is directly in function of science and teaching and under the direct authority of the Faculty Dean. There are two basic activities that are organized and implemented as part of the Centre for Library Information and Publication Activities: the activity of library information which specifically refers to acquiring, professionally processing and storing library materials, producing newsletters, catalogues, bibliographies and other information

tools, enabling use and borrowing of library materials, information flow, educating users on searching information sources and encouraging and helping them in selecting and handling library materials. The second activities encompass record keeping on library materials and its users.

The present management structure in science provides functions as the Vice Dean for Science and the Dean's Counsellor for Science, the Board for Doctoral Studies and the Committee for Scientific Activities and Ethics. There is currently a shortage of staff members in the Office for the preparation and implementation of national and EU projects.

3.1. THE ORGANIZATIONAL PLAN OF DEVELOPMENT

Faculty unit dealing with scientific activities which includes support for establishing new laboratories, a topic that has also been discussed in Faculty Council sessions. The new laboratories must meet the requirements of scientist recognition and/or the ability to conduct projects.

A significant incentive to the overall scientific activity would, in many aspects, be the construction of the Western University Sports Campus in which a prominent role would be played by the new diagnostic centre, as well as by both the existing and new laboratories, in addition with the planned equipment, such as, for example, an altitude simulation chamber, a testing pool with opposite direction water flow and new kinematic equipment with a fixed and mobile camera system. The architecture tender for the project has been completed and the production of the main project is currently underway. Financing is planned through application for EU funds and the project application "Western Campus of the University of Zagreb", which has been submitted in the seventh Public invitation for submitting project proposals for the preparation of the infrastructural projects reserve for the European Regional Development Fund 2014-2020 of the Ministry of Science, Education and Sport of the Republic of Croatia, meet all the prescribed requirements and is thus accordingly included on the indicative list of projects for the Operational Programme Convergence and Cohesion 2014-2020.

4. MISION AND VISION OF THE FACULTY OF KINESIOLOGY

(from the Strategy of the Faculty of Kinesiology 2014-2020)

MISION

The Faculty of Kinesiology University of Zagreb is the leading higher education institution in the field of kinesiology in the area educating personnel for all areas of applied kinesiology based on the latest scientific and professional knowledge. The activities of the Faculty of Kinesiology are based on high academic and ethical values, on knowledge founded on research and professional expertise, as well as on optimal infrastructural conditions. The Faculty strongly contributes to the promotion of sports, sports recreation, physical education of pupils and students and the quality of active living and the health of the citizens of Croatia.

VISION

As the leading higher education institution in the field of kinesiology in the area, the Faculty of Kinesiology University of Zagreb aspires to become an integrated and concurrent institution in the European higher education and research area and aims at establishing new, as well as improving the existing systems of knowledge transfer in all fields of applied kinesiology.

5. SCIENTIFIC ACTIVITIES OF THE FACULTY

5.1. Previous period indicators

The basis of each scientific strategy are the scientists who apply their projects, conduct the research, disseminate the results and use them to educate other scientists. Scientists create the pre-conditions for the continuation of research in the next generations by selecting the best young scientists and by educating doctoral students. There are many scientist performance indicators, however, they are primarily manifested in the number of internationally recognized published papers, which in the system of social and humanistic sciences, as well as other kinesiology-related interdisciplinary fields, can be estimated by the number of papers in the Web of Science database and according to the impact factor of scientific journals, but also by the number of defended doctoral theses, even though there are certain other scientometric indicators.

For the purpose of this Strategy, the number of published papers in journals indexed in the Web of Science database, as well as the overall number of citations of scientists from our institution have been chosen as indicators of scientific activity in the previous period. Data from the last six years show that the scientists from our Faculty published 173 scientific papers in international scientific journals that are indexed in the Web of Science database.

Diagram 1 does not represent papers indexed in WoS in 2011 and 2014, and which are in WoS, due to the fact that in the mentioned years the following scientific conferences took place: *6th International Scientific Conference on Kinesiology*:

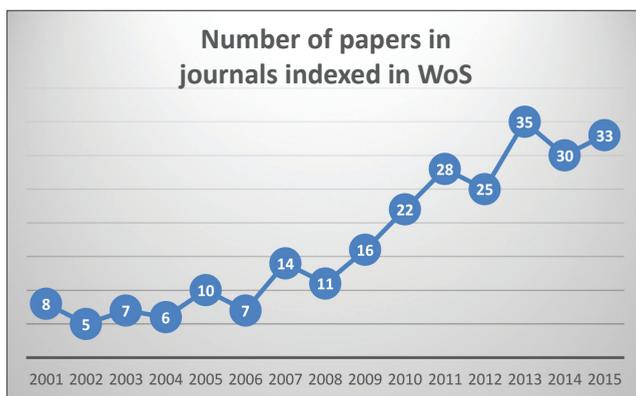


Diagram 1 Number of papers by scientists at the Faculty of Kinesiology per year

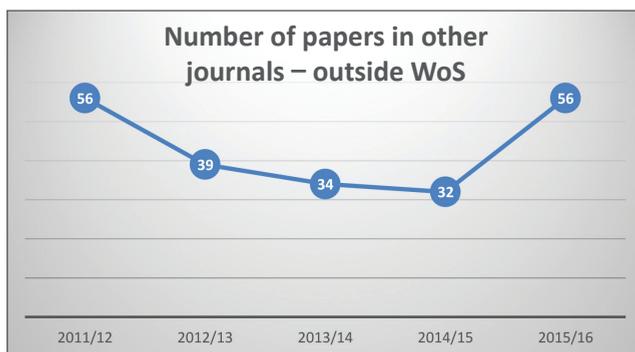


Diagram 2 Number of papers by scientists at the Faculty of Kinesiology published in other scientific journals in the previous 5 academic years

Integrative Power of Kinesiology and 7th International Scientific Conference on Kinesiology: Fundamental and Applied Kinesiology – Steps Forward, as the Proceedings Books of these conferences are indexed in the Web of Science Core Collection (in that case the overall number of WoS papers for 2011 would be 85, and for 2014 around 80).

In terms of citations, the overall number of citations of scientific papers published in the above-mentioned period (2010 – October, 2016) is 1022, that is 928 not including self-citations, while Diagram 2 demonstrates the scope of citations according to years. The conclusion could be made that the papers do not quickly become obsolete, that is, that they are current and cited even several years after the publication.

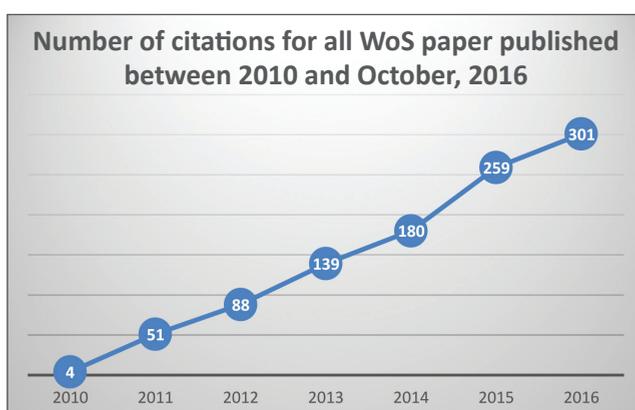


Diagram 3 Number of citations per year – according to the Web of Science (November, 2016)

Besides kinesiology as the primary field of interest, scientific and research activities also refer to other fields of science, namely social sciences (psychology, pedagogy, economy and management), however also biomedical fields (anatomy, physiology, public health, medicine of sports). It is precisely for that reason, but also because it is difficult to compare even individual fields, as well as branches within a certain field (e.g. mathematics and biology), that we decided to compare our Faculty with the Faculty of Kinesiology University of Split on the national level, and with the Faculty of Sports University of Ljubljana on the regional level.

As besides our Faculty, the Faculty of Kinesiology University of Split is the only other faculty in the field of kinesiology in Croatia, we thereby made a comparison of scientific productivity¹. It can be noted that the employees of our Faculty published more than double in the number of scientific papers represented in the Web of Science; in the period between 2010 and 2014, the employees of the Faculty of Kinesiology in Split altogether published 99 papers, while the employees of our Faculty published 197 papers in that same five-year period, whereas in the last five years between 2011 and 2015 our employees published a total of 153 papers (with an additional 217 scientific papers published in journals outside the WoS database). This amounts to 0,4 scientific research per scientist published in WoS indexed journals each year, that is, 1,0 when including other scientific journals (the available data for other institutions are scarce, e.g. the Ruđer Bošković Institute has a little over 2 published research in journals indexed in WoS according to the information from the Strategic plan of scientific research of the Ruđer Bošković Institute 2013-2018 published on their web page).

In a broader regional context, a comparison was made with the Faculty of Sports University of Ljubljana; in the period between 2010 and 2016 a total of 259 scientific papers were published (WoS) with an overall number of citations at 730². The conclusion can be made that the present situation in terms of scientific productivity is only partially satisfactory and that further investments need to be made to stimulate publishing in internationally acknowledged scientific journals (and not in regional and less visible ones).

¹ Data on the number of scientific papers has been taken from the Strategy of development of the Faculty of Kinesiology in Split for the period between 2015 and 2020. The Strategy is available on the official web pages of the Faculty of Kinesiology University of Split at: http://web.kifst.unist.hr/wp-content/uploads/2015/10/Strategija-2015_2020.pdf

² Dana was updated and taken on October 26th 2016, available on the official web pages of the *Slovenian Current Research Information System* at: <http://izumbib.izum.si/bibliografije/N20161026144439-0587.html>

Scientific research, technology projects and projects related with business and the public community

In the period between 2010 and 2016 the scientist at the Faculty of Kinesiology had 48 active projects, including 21 scientific projects by the Ministry of Science and Education, 2 projects financed by the Ministry of Defence, 7 projects by the University of Zagreb, 2 projects by the Croatian Science Foundation, 2 ERASMUS+ projects, 4 projects financed by international professional associations and universities and 10 national projects financed by the local community.

It is important to emphasize that there are 5 projects in preparation which are part of the ERASMUS+ programme and in which the Faculty of Kinesiology is a partner institution, out of which 2 projects have been applied to the Croatian Science Foundation (1 has been approved), and there are 2 national and 2 international projects in collaboration with the economy. All research conducted at the Faculty of Kinesiology are implemented in accordance with national and European strategic research priorities.

According to the presented data, the Faculty of Kinesiology University of Zagreb is an institution of great scientific potential which is more successful than similar institutions in the region, however, the existing scientific potential is currently limited by the state's employment policy for young scientists and new scientific personnel which has been restrictive over the last years.

5.2. Human resources – research base

The Faculty of Kinesiology currently employs 78 employees without including the non-teaching personnel. Among them, in scientific-teaching positions there are 13 full professors with tenure, 8 full professors, 10 associate professors and 24 assistant professors; in teaching positions there are 3 senior lecturers (out of which one with the nominal title of associate professor); while in associate positions there are 7 postdoctorands, 6 senior assistants (out of which one with the nominal title of associate professor), 6 assistants and 3 senior lecturers (out of which one with the nominal title of associate professor). Among other associates, there are 10 employees working as junior research assistants and whose contracts will soon be expired. The average age of researchers is higher than what is desired and a regeneration of the research base is necessary in terms of young staff members.

Scientist mobility

In the period between 2010 and 2016, 4 young scientists from the Faculty completed post-doctoral scientific training in international institutions in the duration of more than 3 months (between 6 and 12 months) within the first 5 years after acquiring their doctorate. In the mentioned period, mobility of both teaching and non-teaching staff primarily took place as part of the ERASMUS and ERASMUS+ programme via the bilateral collaboration between the Faculty and the academic mobility programme at the University of Zagreb. In addition, our scientists and teachers participated in numerous conferences and in the activities of international associations. During the above-mentioned period, there was a total of over 70 outgoing mobilities for different purposes (collaboration agreements, guest lecturers, project meetings, scientific and professional visits). Likewise, we must also mention over 50 participations in various international scientific and professional congresses.

Teaching load of scientists

Over the last two years, the employees of the Faculty of Kinesiology in scientific-teaching positions have worked an average of 383 class hours at the university graduate study. The average values for employees in associate positions, as well as for junior research assistants are 340, that is 301 class hours. In addition to teaching at the university study, most Faculty employees also complete a significant number of class hours by teaching at professional studies at the Coach Education Study Centre every year. To be specific, teachers in scientific-teaching positions who teach courses at professional studies perform an additional 40 class hours per year in those studies, while associates and junior research assistants perform around 33 class hours each year. Therefore altogether, the teaching load for most Faculty employees, related to teaching classes and conducting exams, considerably exceeds the prescribes minimal norms and is at the upper end of the allowed one third for exceeding the teaching load, which reduces the portion of working hours intended for scientific work.

Postgraduate doctoral university study

The doctoral study of kinesiology **qualifies doctoral students** for performing work in science and higher education, both in the private and public sector in general, as well as for development and implementation of scientific accomplishments. The plan and programme of the study is compatible with regional and global social needs, as graduates of the doctoral study of kinesiology find employment in the field of education, sports, recreation, kinesitherapy and other related scientific fields, while

the demand for professionals of such profile is continuous due to the generational shift and the evolution dynamics of the scientific area, as well as due to the national education policy which strategically strives at increasing the educational level of Croatian society. Although the above-mentioned has no direct influence on the economy or on immediate profit making, when considering indicators pointing to the fact that morbidity and mortality of a certain population also depend on the sedentary life style, and not only numerous other risk factors (smoking, obesity, high blood pressure, etc.), then the role of research scientists in the field of sports and/or recreational physical activity is also exceptionally important in economic terms (reduction in the number of injures, sick leave rate, medical expenses, work efficiency of the working population, etc.). Applicants who completed a related graduate university study (field of biomedicine or study of psychology, anthropology or education rehabilitation faculty) can also enrol to the doctoral study of kinesiology with identical requirements as applicants who graduated in a field of study in kinesiology. i.e. without passing differential exams, which increases the possibility of producing interdisciplinary research teams. During the doctoral study, students are required to continuously demonstrate their scientific activity by publishing scientific papers, whereas a prerequisite for defending their doctoral dissertation is publishing a research paper in an internationally acknowledged scientific journal.

*Table 1 Number of defended doctoral dissertations per year**

Year	Number of doctoral dissertations
2010	11
2011	20
2012	17
2013	5
2014	9
2015	12
2016	6

* as a result of introducing a new doctoral study, no applicants enrolled in the doctoral study in 2013 and 2014, while due to the expiry of proscribed deadlines for defending the doctoral dissertation for students with Master degrees, there was an increased number of defended dissertations in the years between 2010 and 2012

5.3. Realisation of objectives from the previous Strategy for Scientific Development 2010-2016

Emphasis should be made on the realisation of the most important goals from the previous Strategy (2010-2016), as can be manifested in the following:

- Double average number of published scientific papers in journals indexed in WoS in relation to the last year before the previous Strategy (in 2010 – 16 published papers in WoS, whereas in 2015 – 33 published papers) and even triple number of published papers when compared to the preceding period (first decade of the 21st century), as well as a higher number of scientific papers published in journals with an impact factor above 1.0;
- Modernised programme of the doctoral study, starting in the academic year 2015/2016 according to the new programme for which a licence had been obtained;
- Establishment of 7 new laboratories;
- Application of several international scientific projects, including two Horizon 2020 projects (even though still not approved);
- Realisation of more than 10 projects with the public community;
- Agreements for three technology projects in collaboration with the economy;
- Election of 20 young scientists to scientific-educational titles;
- Establishment of a quality management system based on the ISO 9001 standard;
- Implementation of expertise for the community;
- Adoption of Regulations on scientific training and participation in scientific conferences;
- Introduction of transparent Regulations on the valorisation of scientific work of scientists, based on measurable indicators of scientific activity;
- Conducting training in the field of scientific management;
- Establishing the Office for the preparation and implementation of national and EU projects.

On the other hand, the following goals were not realised:

- Registration of patents (further difficulties are expected in this area, as products of scientific and research work in the field of kinesiology are often not introduced as patents);

- Outgoing mobility for postdoctoral training indicates a certain increase, however, not at a satisfactory level as only 5% of scientists completed such training;
- Additional staff was not employed at the Institute of Kinesiology, however, the systematisation of work positions has been modified in such a way that each laboratory was estimated to hire one or two laboratory or expert assistants which has created pre-conditions for support staff members in laboratories and that shall significantly facilitate work for scientists;
- Establishing new laboratories within the Institute of Kinesiology, but without adopting Regulations on the organisation and functioning of the Institute and without opening new work positions at the Institute (related only with the work of laboratories);
- Establishing the Office for the preparation and implementation of national and EU projects, however due to the prohibition of employment, without any full-time employment (the Faculty hired one person who works in a reduced number of working hours and is paid by the Faculty).

5.4. SWOT analysis

Strengths

- Relatively large number of scientists at the institution;
- Job security;
- Existing laboratories;
- Developed system of financial stimulation for scientific activities based on published scientific papers;
- Openness of the Faculty management for supporting scientific projects and new laboratories;
- High number of bilateral agreements with international universities;
- Kinesiology as a scientific journal publishing papers in field of general and applied kinesiology which is indexed in most cited databases in the world;
- International Scientific Conference on Kinesiology;
- Joining the EU in 2013 enabled applying to more tenders for scientific projects;
- Interdisciplinarity of present scientists from different fields (biomedicine, technical sciences, various fields of social and humanistic sciences);

- Financial resources acquired through services provided by the Faculty (also a weakness as they increase both teaching and administrative obligations of scientists).

Weaknesses

- Publishing scientific papers in international journals with below average index factors;
- Low scientist mobility;
- Very little international training during and immediately after the doctoral study;
- Lack of internationally competitive research teams within the Faculty;
- Excessive dependence on budget financing;
- Shortage of administrative staff educated for assistance in applying for international scientific projects;
- Shortage of personnel in the Office for the preparation and implementation of national and EU projects;
- Considerable teaching load of scientists in terms of classes at the university and professional study;
- Lack of some form of compensation for stimulating applications and implementations of international projects, as well as projects of the Croatian Science Foundation (most often defined in the requirements for the project);
- Very few national tenders for scientific research.

Opportunities

- Potential development of new research potentials in relation to the strategic project of the Western Campus;
- More scientific activity performed by students of the doctoral study and more publications;
- Collaborations with international universities in applying for international EU projects, particularly Horizon 2020;
- Collaborations with the economy in research and innovation activities;
- Enabling of international tenders for scientific projects, especially in the field of public health;

- Legal framework for the possibility of 12 + 12 months of training in international universities;
- Construction of the Western University Campus along with establishing new laboratories and a new Diagnostics Centre.

Threats

- Insufficient government funding for science;
- Lack of opportunities and tenders for paid doctoral studies with full time employment;
- Directing of young scientists towards teaching, but also towards work unrelated with research;
- Inconsistent governmental politics which might pose as a threat for the development of the Western University Campus project;
- Rival institutions in Europe oriented towards excellence in science with less teaching load on scientists;
- “Brain drain” of top level staff;
- Lack of tenders for projects aimed at research in the field of kinesiology in sports.

6. MAIN OBJECTIVES OF THE SCIENTIFIC STRATEGY OF THE FACULTY OF KINESIOLOGY 2017-2022

Providing the necessary conditions for creative scientific and research work aimed at producing new and deepening existing knowledge in all fields of general and applied kinesiology and related interdisciplinary fields, along with doubling the amount of scientific production in internationally recognized scientific journals by increasing the number of published scientific papers, as well as the level of quality of the scientific journals in which the papers are published.

6.1. Specific strategic objectives

SPECIFIC STRATEGIC OBJECTIVE 1: Improve scientific and research productivity

Objective: Improve recognisability of the Faculty in the international scientific community through publications in internationally indexed scientific journals

Activity 1: Increase financial stimulation for publishing scientific papers in the WoS database, especially papers published in the first quartile, i.e. high impact factor journals

Activity 2: Ensure financial resources for dissemination of results in scientific journals with high impact factors, i.e. in journals with first-quartile impact factors for scientific papers resulting from Faculty scientific projects (by securing funds as part of the financial plan)

Activity 3: Set up web page for laboratories and/or research centres

Indicators: Number of scientific papers and citations according to the WoS database in relation to the previous year, including the portion of papers published in the first and second quartile

Competent bodies: Vice Dean for Science, Dean's Counsellor for Science, Committee for Scientific Activities

SPECIFIC STRATEGIC OBJECTIVE 2: Ensure human resources in science and improve efficiency, contribution and collaboration between staff members with the aim of accomplishing the scientific objectives of the Faculty

Objective: Increase the number of active scientists

Activity 1: Assign scientists to existing individual laboratories, forming internal research teams based on competences and mutual scientific interests of scientists connected with existing laboratories and establishing research teams or with forming new laboratories

Activity 2: Ensure financial resources in the annual budget for implementing internal scientific and scientific projects for scientists at the Faculty

Activity 3: Secure status for existing young scientists and hire new ones

Activity 4: Include doctoral students in the activities of the laboratory and valorisation of their work as part of the evaluation of their progress at the doctoral study (credits for scientific activity)

Activity 5: Improve scientific collaboration between teachers, departments and chairs (as well as constituents of the University of Zagreb), in addition to organizing and conducting workshops and activities for development of personal, scientific and teaching competences of staff members

Activity 6: Stimulate participation of scientists in scientifically oriented education (seminars, workshops, courses, etc.), in addition to enabling transfer of the acquired knowledge to other Faculty scientists

Activity 7: Stimulate participation of Faculty scientists in national and international scientific boards and committees

Indicators: Increased number of scientists in individual laboratories when compared with the previous year, and the number of organized workshops, courses and seminars for teachers

Competent bodies: Dean, Vice Dean for Science, Vice Dean for Business Policy and Finances, Committee for Doctoral Studies

SPECIFIC STRATEGIC OBJECTIVE 3: Modernization and procurement of capital and medium scientific equipment and other material resources

Objective: Procurement of scientific equipment from multiple resources, including Faculty, University, national and international tenders, as well as through commercial sponsorship, i.e. by means of projects or tenders for scientific equipment. Research equipment must follow current trends in science, however, as well be adapted to human resources and assigned to laboratories and research centres within the Institute of Kinesiology.

Activity 1: Ensure financial resources within the Faculty budget for procurement of scientific equipment

Activity 2: Stimulate applying for tenders for capital and medium equipment from other sources

Activity 3: Modernise the equipment and resources required for conducting research on the highest level, including improvements in the library, laboratories and information services

Indicators: Financial resources invested in scientific infrastructure and equipment

Competent bodies: Dean, Vice Dean for Science, Vice Dean for Business Policy and Finances

SPECIFIC STRATEGIC OBJECTIVE 4: Development of science through national and international scientific projects

Objective: Increase the number of applications for national and international projects, as well as business related projects

Activity 1: Hire at least one full-time professional at the Office for the preparation and implementation of national and EU projects as support for scientists in applying and preparing projects

Activity 2: Ensure financial resources within the Faculty budget for participating (in the required percentage) in the financing for the applied projects

Activity 3: Issue a Decision on the reduction of teaching load for teachers with an approved national or international project

Activity 4: Stimulate projects in collaboration with business partners, i.e. with partners from the private sector

Activity 5: Conduct a discussion and determine the position of kinesiology within the field of social and humanistic sciences, as well as elaborate the advantages (particularly in relation to national projects) and risks of transitioning to an interdisciplinary field

Indicators: Number of applied and approved scientific projects compared with the previous year

Competent bodies: Vice Dean for Science, Dean's Counsellor for Science, Vice Dean for Business Policy and Finances

SPECIFIC STRATEGIC OBJECTIVE 5: Improve scientific recognisability through Centres of Excellence or Reference Centres

Objective: The Office for the preparation and implementation of national and EU projects should attend to the application of at least one Reference Centre or Centre of Excellence

Activity 1: The Committee for Science should determine scientific research fields with potential for acquiring the status of National Centres of Excellence

Activity 2: Establish collaboration between the mentioned centres and one of the leading international institutions

Activity 3: Internationalization of the activities of the centres by conducting international scientific projects

Indicators: At least one established Centre of Excellence within a period of five years

Competent bodies: Dean, Vice Dean for Science, Committee for Science

SPECIFIC STRATEGIC OBJECTIVE 6: Enable knowledge transfer and promote science in public life, as well as disseminate scientific activities of the Faculty and the application of science in different activities and spheres of public life

Objective: Participate in domestic and international scientific and professional conferences, as well as publish scientific accomplishments in popular scientific journals and scientific conferences

Activity 1: Stimulate dissemination of scientific results in popular scientific journals

Activity 2: Present research, projects and results in scientific and professional conferences

Activity 3: Organize public forums in collaboration with professional associations which may have direct benefits from that scientific knowledge

Activity 4: Arrange communications towards the public upon the publishing of results of scientific research

Activity 5: Organize presentations and workshops in relation to essential public questions on physical activity and health, sports and other fields of applied research in kinesiology

Activity 6: Organize science festivals, free counselling and open door days in laboratories for associates, the public and future students

Activity 7: Organize lifelong learning programmes

Indicators: Number of published scientific papers in popular journals, number of workshops, courses, festivals and scientific conferences organized by the Faculty or in which scientists from the Faculty participated in

Competent bodies: Heads of Departments, Vice Dean for Science

SPECIFIC STRATEGIC OBJECTIVE 7: Improve scientific activities of undergraduate, graduate and doctoral students

Objective: Increase the number of doctoral students included in the work of laboratories or research groups

Activity 1: Present the existing laboratories and research groups to doctoral students

Activity 2: Conduct a survey on student their preferences for individual research fields

Activity 3: Include doctoral students in existing research projects and teams and in applications for new projects

Activity 4: Recognize students with exceptional academic potential and ability for scientific thinking and include them in the programme for stimulating scientific activity among students

Activity 5: Stimulate experimental master's theses

Activity 6: Ensure reward systems for students with scientific papers published in journals (Dean's Award, relieving students from covering participation fees in scientific conferences, etc.)

Indicators: Number of scientific papers by Faculty researchers which include students

Competent bodies: Head of doctoral study, heads of laboratories, Committee for Doctoral Studies, Dean's Counsellor for Science, Vice Dean for Business Policy and Finances

SPECIFIC STRATEGIC OBJECTIVE 8: Strategy of development for the scientific journal KINESIOLOGY – INTERNATIONAL JOURNAL OF FUNDAMENTAL AND APPLIED KINESIOLOGY

Objective: The main objective for the following five-year period shall be to accomplish an impact factor of 1. Partial goals shall be completed by the publishing of scientific papers with more views and number of citations in relation to the previous five-year period.

Activity 1: Encourage publication of scientific papers in fields of applied kinesiology with higher possibility of citations, as well as publishing reviewed papers

Activity 2: Include as many world-renowned scientists as possible into the review process and introduce a more stricter process of preliminary review which would reduce the load on the reviewers

Activity 3: Determine more clearly the fields of scientific research or sections that are of primary importance for the journal by analysing the citations of papers published in the scientific journal Kinesiology (scientific papers that are cited and published in reviewed papers which are published in other journals or scientific books are of special importance)

Activity 4: Maintain and increase the present annual financial resources received from the Ministry of Science and Education

Activity 5: Enable an increase in the number of professional staff included in the work of the Editorial Board and in the editing process of the journal at the expense of state resources

Activity 6: Recognize and acknowledge the editorial work performed by the employees of the Faculty of Kinesiology according to the criteria defined in the Regulations of the Faculty

Indicators: Impact factor of the scientific journal

Competent bodies: Editor-in -Chief and the Editorial Board, Dean

SPECIFIC STRATEGIC OBJECTIVE 9: Strategy of development for the conference: International Conference of Kinesiology

Objective: Increase scientific quality of the International Conference of Kinesiology as it presents an important project for ensuring international recognisability of the Faculty of Kinesiology University of Zagreb

Activity 1: Ensure the best invited speakers in individual sections

Activity 2: Thematised the Conference in terms of more invited speakers in the field which shall be the main topic of the Conference

Activity 3: Increase the number of workshops and practical seminars within individual sections in order to emphasize the importance of knowledge transfer into practice and maintain the good practice of organizing satellite symposiums, as well as further develop this idea in the organization of future Conferences

Activity 4: Maintain the level of indexation of the Proceedings Books from the Conference in relevant databases

Activity 5: Enhance and promote the visibility of the Conference by means of various promotion strategies, increase the number of participants and more intensely connect the Conference with the sports industry

Indicators: Number of international participants in the Conference

Competent bodies: President of the Organization Committee, Organization and Programme Committees of the Conference, Vice Dean for Business Policy and Finances, Dean

7. EXPECTED OUTCOMES OF THE STRATEGY

All the above-mentioned objectives are feasible and present an opportunity to improve the scientific activities of the Faculty, as well as its international recognisability.

Among primary expected outcomes, we anticipate a continuous increase in the number of scientific papers and citations based on Faculty research, particularly in clinical medicine, with more participation from students and doctorands in working laboratories. Likewise, we expect an increase in the quality of scientific papers, which is in relation to the first strategic objective that refers to increasing the scientific level of published papers. If the mentioned strategic objectives shall be completed, then it can be expected for the Faculty to achieve increased recognisability and competitiveness as a scientific institution.

Faculty scientists shall have to orient on securing funds from international institutions, i.e. it is indispensable to increase the number of applications for tenders from international institutions. A satisfactory outcome in this aspect would be to secure more funds for projects than the amount thus acquired in the previous five-year period. In case that scientific activities at the Faculty receive part of the required resources within the Faculty's budget and by means of administrative support in function of developing science, it can be expected that an increase in the number and quality of applications to international and domestic tenders occurs, which is in accordance with the set objective. A prerequisite for such a development is to hire one or two persons for administrative support to scientists in applying projects. This type of assistance shall ultimately stimulate young associates to focus more actively towards research activities. Based on the current situation in the Republic of Croatia, there shall be a reduced number of tenders financed on behalf of national institutions and no increase is expected in the amount of financial resources invested in scientific activities in this aspect.

Support measures for activities of existing laboratories and establishing new ones, in addition to expanding already recognized research groups can result in the spread of scientific development that shall constitute a measurable approximation to institutions in Austria or Italy. It is essential to provide assistance form expert associates and laborants by way of national measures or project resources. New scientists from other Faculty Departments and Chairs are expected to participate, mutually connect and join in scientific activities, particularly in establishing an International Centre of Excellence in the field of physical activity and health. The expected outcome of investing Faculty resources in scientific infrastructure would be at a higher level than in the previous period. An added value towards the recognisability of the Faculty is anticipated through collaborations with professional associations and popularization of science. On the basis of the strategic objective related to the scientific engagement

of doctoral students, we expect for at least 1/3 of the students to actively participate in the activities of an existing laboratory or research group.

The international scientific journal *Kinesiology* shall be publishing papers in applied fields of kinesiology that present a higher possibility for citations (due to the larger number of journals in that field where papers published in the *Kinesiology* journal can be cited and because of the amount of scientific productivity in the mentioned field), as well as an increased number of reviewed scientific papers (particularly in fields with higher scientific productivity). Consequently, the international visibility of the Faculty and the impact factor shall also improve.

In terms of the International Scientific Conference on Kinesiology, further improvements are expected in the organizational and scientific programme of the Conference. Likewise, collaborations with significant associations, institutions and individuals in the field of kinesiology as an important part of improving high quality international collaboration, which is an essential precondition for implementing international scientific research and projects.

By way of consistent implementation of the set strategic objectives that shall be supervised by the Committee for Scientific Activities and Ethics it is possible to anticipate the realisation of the main strategic goal of developing science at the Faculty of Kinesiology University of Zagreb.

8. INDICATORS OF EFFICIENT STRATEGY IMPLEMENTATION

Main performance indicators that shall be monitored are the following:

- Overall number of published papers in scientific journals;
- Quality of scientific journals in which the papers are published (measured by the journal's impact factor);
- Number of published papers in scientific journals with impact factors above the median value for that field (papers published in scientific journals with impact factors above the double median value for the field shall be considered as extreme quality papers);
- Citations from scientific papers of Faculty scientists by other scientists;
- Number of scientists assigned to existing laboratories;
- Establishing Centres of Excellence or Reference Centres;
- Evaluations of scientific activities from international reviewers;
- Financial resources invested in scientific infrastructure and equipment;
- Increase of the impact factor of the International Scientific Journal Kinesiology;
- Increase in the number of participants at the International Scientific Conference on Kinesiology and the number of collaboration agreements resulting from contacts established through the Conference;
- Number of applications for national and international projects;
- Number of approved national and international projects;
- Presentations of scientific accomplishments in international and national conferences.

9. CONCLUSION

The strategic guidelines of the Faculty of Kinesiology for the 2017-2020 period are in accordance with the Strategic Plan for Scientific Development of the University of Zagreb, National Strategy for the Development of Education and Science and the Europe 2020 Strategy, however they are also determined based on the existing human and material resources, as well as on the basis of potential threats. Over the past decade, the Faculty has demonstrated a positive trend in scientific activity indicators, however, attempts should be made towards achieving higher scientific indicators than those usually assigned to the social and humanistic field. Over the past ten years, an improvement in the level of international recognisability has been noticed, as well as the initiation of collaboration with the business sector, an increase in the number of applications for international projects and a tendency towards focusing on international recognisability. The basic goal of this Strategy is reflected in the attempt to develop the Faculty into a more internationally respectable and recognizable scientific institution that shall function as the initiator of research in kinesiology and interdisciplinary fields related to kinesiology, which shall contribute not only to the quality of the teaching process, but also to social prosperity.

SCIENTIFIC FIELDS in which the Faculty of Kinesiology conducts scientific research include various fields that are part of *social and humanistic sciences*, as well as the *field of biomedicine and health*. The above-mentioned is manifested through the mentioned scientific topics (Appendix 1), as well as in the structure of scientific personnel.

Staff member and bodies required for the implementation of the Strategic Plan for Scientific Development of the Faculty of Kinesiology University of Zagreb for the 2017-2020 period

The Strategic Plan for Scientific Development of the Faculty of Kinesiology University of Zagreb can be implemented only if the holders of all the planned activities are precisely defined. The Faculty Dean shall delegate parts of the implementation process of the Strategy to a larger number of Faculty employees within the frames of his authority and with the aim of identifying Faculty employees with the objectives of the Strategy as much as possible. In this context, in addition to the previously mentioned tasks defined under “Competent bodies for monitoring performance indicators according to determined tasks and terms” in this Strategy, the following staff members and Faculty bodies shall also be appointed with special assignments and authorities:

- Dean;
- Faculty Council;
- Vice Dean for Science;
- Vice Dean for Education and Students;
- Vice Dean for Business Policy and Finances;
- Dean's Counsellor for Science;
- Heads of Departments;
- Heads of Laboratories;
- Committee for Doctoral Studies;
- Committee for Scientific Activities and Ethics;
- Committee for International Relations;
- Office for the preparation and implementation of national and EU projects;
- Committee for monitoring the implementation of Regulations for salary, remuneration conditions and other financial and non-financial income of employees;
- Editorial Board of the International Scientific Journal Kinesiology;
- Organisational and Programme Board of the International Scientific Conference on Kinesiology;
- Committee for Financial Investments;
- Committee for Quality Management and Improvement;
- Secretary;
- Centre for Library Information and Publication Activities;
- IT Support Centre.

APPENDIX I: SCIENTIFIC TOPICS OF KINESIOLOGICAL AND INTERDISCIPLINARY RESEARCH

P.1.1. RESEARCH IN THE FIELD OF KINESITHERAPY

Research in the field of kinesitherapy shall be directed towards studying the role of physical exercise in primary, secondary and tertiary prevention, as well as in treating numerous disease and contemporary degenerative conditions that can occur in persons of different age. Scientific topics in the field of kinesitherapy that the Faculty of Kinesiology tends to research cover various domains of diagnostic procedures in kinesitherapy and the specificities in planning and programming kinesitherapeutic procedures of different target orientations, during growth and development, in adults and in the process of aging for persons of different health status and level of physical activity.

P.1.1.a. Research on diagnostic procedures in kinesitherapy

Objective: to gain new scientific insight on methods for diagnosing the physical condition of persons of different age, health condition and level of physical activity.

Research topics:

- Basic epidemiological research on the specificity of sports injuries and the potential role of diagnostics in early detection of increased risk for injuries in professional and recreational athletes;
- Basic epidemiological research on the level of physical activity in persons diagnosed with many contemporary disorders that affect the neuromuscular function in humans (e.g. peripheral and central neurological disorders, certain metabolic disorders, etc.);
- Applied research aimed at studying optimal diagnostic procedures for assessing motor and functional abilities of children, adults and elderly persons with different health conditions;
- Development research directed towards producing innovative diagnostic procedures for assessing the neuromuscular function and for detailed analysis of physiological and pathological patterns of human movement.

P.1.1.b. Research in the field of planning and programming kinesitherapeutic procedures

Objective: to gain new scientific insight on the effects of kinesitherapeutic procedures of different target orientations on human health, with the aim of studying basic planning concepts for kinesitherapeutic procedures (timeframe for planning kinesitherapy in relation to the expected recovery dynamics of the organism, the planned loading progression dynamic during the therapy, etc.), as well as to discover new insight on substrate mechanisms of acute and chronic adaptation of the human body to physical exercise in a state of ill health.

Research topics:

- Studying kinesitherapeutic programmes in the system of primary, secondary and tertiary prevention aiming at increasing the quantum of knowledge in the field of planning and programming kinesitherapeutic procedures;
- Applied research on the specificity of selected physical exercising concepts, dosing and load distribution in treatments of various disorders (neurological, cardiological, respiratory, endocrine, psychological or multifactorial);
- Applied research on acute and chronic effects of kinesitherapy on health in general and on the functionality of movements in everyday life, in persons of various age and health condition;
- Monitoring the duration of the achieved results through so-called “*de-training studies*” as part of which examinees would be monitored even after the kinesitherapeutic treatment in an attempt to determine the dynamics of the reduction of the results accomplished by kinesitherapy;
- Effects of extrinsic and intrinsic factors on the results of the kinesitherapeutic treatment;
- Examining the field of adapted physical activities with the goal of promoting health for children and adults with disabilities;
- Development research for evaluating innovative kinesitherapeutic procedures for the purpose of determining optimal modalities of therapeutic physical exercise with regard to the specificity of the exercise (different target orientations), the exerciser (age, health condition, motor function, etc.), the conditions in which the treatment is conducted (hospital, home care, etc.) and the technology used in the treatment (informatization, virtual interfaces, etc.).

With regard to the close connection between the study subject of kinesitherapy and biomedical sciences, interdisciplinary research can also be conducted (chapter P.1.3.) in collaboration with related scientific and clinical institutions. In this regard, there is a possibility of forming new directions in research of movement and its correlation with health status and quality of life in the broadest sense of the term.

P.1.2. RESEARCH IN THE FIELD OF KINESIOLOGY OF SPORT

Research in kinesiology of sport are essential for the development of sport and sports activities, as well as health preservation among athletes. This type of research can significantly ensure a level of quality in the activities of all professional staff in sports and a more efficient implementation of transformational processes in certain monostructural, polystructural, complex and conventional sports branches, as well as in physical conditioning of athletes. The mentioned research should provide scientific support in the work of coaches and other professional staff in sports. In order to achieve the best possible effects on the system of sports in the Republic of Croatia, the research should be implemented in collaboration sports institutions (Croatian Olympic Committee, sports federations, etc.) and the results should be part of everyday practice in sports fields (sports clubs, coaches, etc.).

The mentioned research is conducted in laboratories and on the field by means of activities by scientifically productive employees in collaboration with doctoral students and related institutions for the purpose of ensuring an interdisciplinary approach to the researched topics.

General objectives:

- To gain new scientific insight on complex difficulties in sports and physical conditioning.
- To incorporate the results of scientific research and innovations into sports practice.
- To promote participating in sports and achieving top level results.
- To improve collaborations with domestic and international institutions in the field of sports.

P.1.2.a. Research on characteristics of sports activities

Objective: to determine structural, biomechanical and functional characteristics of performing individual sports activities, model characteristics in top level performance and the correlation between certain characteristics and performance efficiency in sports.

Research topics:

Structural analysis of sports activities

- Analysis of technical and tactical elements and situational efficiency in individual sports branches;
- Determining the characteristics of movement of athletes that enable efficiency in competitions and reduce risk of injury.

Biomechanical analysis of sports activities

- New equipment and technical systems shall be used to measure kinematic and kinetic characteristics of movement and enable determining the level of efficiency for the measured locomotion;
- Electro-muscular analysis shall allow obtaining data on muscle activation during motor performance;
- Biomechanical research of elite sports performance.

Functional analysis of sports activities

- Determining the domination of energy processes and physiological and biochemical reactions to training loads and competitions;
- Assessing performance and training efficiency by using functional measurements, lactate measurements and video and GPS analysis.

Analysis of development trends of sports results

- Determining the regularities of result development in individual sports and analysis of dynamics of Olympic results, world records, competition records and other competitive results.

History of sports development

P.1.2.b. Research on characteristics (abilities; characteristics and motor skills) of athletes

Objective: to assess the abilities, characteristics and motor skills of participant in sports activities by using a battery of tests for determining basic anthropological characteristics, specific abilities and skills, standard indicators of performance efficiency and the level and dynamics of physical conditioning in sports and sports results.

Research topics:

Analysis of basic anthropological characteristics of athletes

- Determining the effects of basic anthropological characteristics (health condition, morphological characteristics, functional abilities, motor abilities, cognitive abilities and personality characteristics) on accomplishments in sports;
- Application of new technologies in determining the demands of individual sports activities on beginners' athletes and top level athletes;
- Motor development of humans from birth to old age;
- Identification of talents and development of athletes.

Analysis of specific abilities and skills of athletes

- Determining abilities responsible for certain specific factors of preparedness, as well as the relation between them;
- Determining specific physical conditioning abilities and skills, as well as technical and tactical abilities and skills. Research on psychological preparation have a very important role.

Registration and analysis of performance efficiency in competitions

- Monitoring athletes during activities to determine their performance efficiency;
- Researching standard indicators of performance efficiency in competitions, as well as performance indicators of technical and tactical elements.

P.1.2.c. Research On Transformational Processes In Sports

Research on the effects of physical exercise methods and teaching methods

Objective: to monitor and evaluate short-term and long-term modifications in abilities, characteristics and skills of athletes as a result of growth, development and participation in physical exercise and training programmes. To enable a more

successful modelling of programmes for the development and maintaining of physical fitness, as well as a more successful modelling of programmes of teaching technical and tactical skills.

Research topics:

Analysis of the effects of physical conditioning training methods

- Studying the development of functional and motor abilities and morphological characteristics;
- Evaluating the effects of various programmes and methods of physical exercise on abilities, characteristics and skills of athletes;
- Assessing the abilities, characteristics and skills of athletes in different environmental conditions during trainings and competitions (surface of the field, temperature, humidity, altitude, etc.).

Analysis of the effects of methods for technical and tactical preparation

- Studying the effects of various methods of teaching technical and tactical skills by applying different ways of providing initial information and feedback.

Research on the effects of the physical conditioning process

Objective: to assess the planning and programming of the training process, competitions and recovery through longitudinal and transversal studies on modifications of abilities, characteristics and skills of athletes, as well as on sports results in different cycles of physical conditioning (preparation, competition and transition period; annual, Olympic and multiannual training cycle).

Research topics:

- Chronic adaptations of the athlete's body to the training process and/or to environmental factors in the system of physical conditioning;
- Modelling and evaluating the process of physical conditioning in short cycles, one-year cycles or multi-year training cycles;
- Assessing the effects of various training programmes or models for acquiring physical fitness on sports results;
- Acute reactions of the athlete's body to training and competition loads;
- Studying different nutrition and supplementation processes and regimes on recovery and efficiency of athletes.

P.1.3. RESEARCH IN THE FIELD OF KINESIOLOGICAL ANTHROPOLOGY

Research in this scientific field are directed towards studying biological features, physical characteristics and functional abilities connected with physical activity and sports efficiency, their variability in relation to gender, sports/discipline, level of performance efficiency and dynamics of age-related modifications; prevention of disorders in athletes and general population, as well as studying acute and chronic adaptations of the human body under the influence of various forms of physical load in terms of trainings r recreational activities, nutrition, habitual physical activity and other intrinsic and extrinsic factors. Likewise, this research is also directed towards evaluating the effects of physical exercise programmes on the physiological and psychological status of individuals, athletes or recreational exercisers, as well as on studying the effects of applying specific intervention programmes for improving sports accomplishments, the experience of quality of life and overall wellbeing. Scientific problems in this field are researched within existing laboratories, but also very often on the field and in collaboration with students from other scientific institutions.

General objectives:

- Gaining new scientific insight on the effects of physical activity on morphological, functional and motor abilities, prevention of disease and complementary effects of physical activity on the progress of acute and chronic disorders; physical activity as therapy in chronic diseases;
- Gaining new scientific insight on the physiological mechanisms that enable adaptations to training, and thus also on better sports results;
- Gaining new scientific insight on the psychological mechanisms that enable a better adaptation to training and competition demands, and thus also on better sports results;
- Evaluation of the existing and developing new theoretical models accounting for the psychological background of engaging in sports and physical exercise, as well as for the variations that result in different performance efficiency in the field of sports and recreation;
- Gaining new scientific insight on the factors behind the process of motor learning and motor control;
- Applying research results in the field of sports, sports recreation and health care;
- Promoting sports and physical exercise for the purpose of health improvement.

P.1.3.a. Research on adaptation of physiological systems and morphological characteristics in the body during physical activity

Objective: to acquire new scientific knowledge on the mechanisms and possibilities of assessing adaptations in certain systems of the human body, especially the muscular, skeletal, cardiovascular and respiratory systems. To determine the adaptations in body composition in relation to physical activity and life style.

Research topics:

- Adaptations of the cardiovascular system to physical activity;
- Adaptations of the muscular and skeletal systems to physical activity;
- Adaptation of the respiratory system to physical activity;
- Adaptations in body composition caused by physical activity, nutrition and various habits;
- Physical activity and its effects on growth and development;
- Physical activity and its effects on degenerative changes in the body;
- Adaptations of the thermoregulatory system to physical activity.

P.1.3.b. Research on biochemical and functional diagnostics

Objective: to determine the applicability of biochemical indicators on controlling the effects of physical activity and to determine the possibility of applying various diagnostical procedures in controlling the level of physical conditioning in athletes and the general population.

Research topics:

- Biomarkers for oxidational stress in controlling the effects of physical activity on the human body;
- Biomarkers for chronic disease in controlling the effects of physical activity on the human body;
- Biomarkers for the endocrine system in controlling the effects of physical activity on the human body;
- Physical load and inflammation indicators, as well as indicators of response of the endocrine system;
- Characteristics of load tests for measuring the level of functional ability, oxygen intake kinetics, aerobic and anaerobic capacities;
- Characteristics of load tests for measuring abilities caused by adaptations in the musculoskeletal or nervous system.

P.1.3.c. Research in the field of physical activity and lifestyle habits; external factors as effects of environmental factors on adaptations during physical load

Objective: to determine the effects of various internal and external lifestyle factors on the level of habitual physical activity, as well as on the overall health condition and level of capability of the body

Research topics:

- Methods for determining the level of habitual physical activity;
- Research on the effects of nutrition;
- Research in the field of application of approved and unapproved supplementary aids for improving health or sports results;
- Effects of training on brain hypoxia;
- Effects of training in the hot or in the cold;
- Effects of polluted air on adaptations in the body caused by physical activity;
- Extreme, adrenalin sports and the limits of human abilities;
- Changes in time zone, ratio of day and night and adaptations of the training programme;
- Effect of sports gear characteristics on the incidence of injuries.

P.1.3.d. Research on the effect of physical activity on prevention and evolution of chronic diseases

Objective: to improve the existing knowledge on the incidence and prevalence of chronic diseases in relation to physical activity and the effects mechanism of physical activity on prevention of chronic diseases through using the existing knowledge in this field.

Research topics:

- Epidemiological research of physical activity performance indicators on prevention of chronic diseases (especially cardiovascular, metabolic and locomotor diseases);
- Physical activity effects mechanisms on individual systems in the human body responsible for the development of chronic disease;
- Research on the effects of physical activity on the development of complications, treatment modifications and diagnosing chronic diseases;
- Effects of health-related promotional activities on habitual physical activity of the general population.

P.1.3.e. Research in the field of psychology and sociology of sports and physical exercise

Objective: to gain new scientific insight on the effects of various psychological and sociological factors effecting the characteristics of habitual physical activity in the general population and sports results of promising and top level athletes, as well as the complex interrelation between sports and society.

Research topics:

- Adherence in physical exercising programmes;
- Adherence in sports;
- Motivational processes in physical exercising and sports;
- Management in sports and physical exercise;
- Benefits of sports and physical exercise for psychological wellbeing and quality of life;
- Psychological background of sports success in individual and team sports;
- Effects of physical conditioning on sports success;
- Sports for children and adolescents;
- Process of motor learning and teaching;
- National identity and sports;
- Role of sports in adolescent leisure time;
- Sports, sports fans and (sub) cultures among young persons.

P.1.4. RESEARCH IN THE FIELD OF KINESIOLOGICAL EDUCATION

Scientific and research topics in the field of kinesiological education include some very comprehensive areas, such as the following: diagnostics, planning and programming procedures, monitoring and evaluating work effects and education of physical education teachers.

P.1.4.a. Diagnostics in kinesiological education

Diagnostics in the field of kinesiological education encompasses a wide range of research on kinanthropological characteristics of unselected population. Likewise, it also includes testing procedures for motor skills and accomplishments on unselected population.

Objective: to assess and measure abilities, characteristics, motor skills and accomplishments of unselected population by using test for assessing kinanthropological characteristics, specific abilities and skills, as well as motor accomplishments of pupils.

Research topics:

- Analysis of basic anthropological characteristics of unselected population;
- Analysis of specific abilities and skills, as well as motor accomplishments of pupils, Diagnostics of the condition of preparedness in unselected populations of pupils;
- Motor and functional development of pupils;
- Talent identification and pointing them towards sports.

P.1.4.b. Planning and programming procedures in kinesiological education

Research orientation within this field is directed towards studying procedures in teaching, i.e. basic planning and programming procedures in the field of kinesiological education, as well as studying the factors effecting it. Simultaneously, the topic of interest is also that what is taught, multiple limitation factors that affect the process of teaching.

Objective: to study basic guidelines in planning and programming in the field of kinesiological education, the content of learning and teaching, however also the numerous limitation factors that affect the process of teaching.

Research topics:

- Scientific guidelines of planning and programming;
- Scientific aspects of different types of curriculums;
- Effects of the programme on different learning outcomes;
- Effects of the individual approach of working in education;
- Limitation factors in the education process.

P.1.4.c. Monitoring and assessment of wrk effects in kinesiological education

Research orientation within this field is directed towards the teaching process. The main topic of interest is the development and structure of the teaching process, teaching environment and teaching outcomes (motor abilities and skills, attitudes, accomplishments, social responsibility, public capital, physical activity and fitness).

Objective: to monitor and assess work effects in kinesiological education by using longitudinal and transversal studies directed towards examining the development and structure of the teaching process, teaching environment and various teaching outcomes.

Research topics:

- Structure of teaching;
- Modelling and assessing teaching methods;
- Assessing the effects of teaching (teaching outcomes);
- Research on different intervention procedures on the academic performance of pupils.

P.1.4.d. Teacher education

Research orientation within this field is directed towards the education and training of physical education teachers, as well as on their lifelong training.

Objective: to research historical aspects of educating the teaching staff in the Republic of Croatia and in the world, to implement a series of studies researching the efficiency of various teaching methods and teaching outcomes in teacher education, their lifelong training, but also their attitudes.

Research topics:

- Historical aspects of teacher education in Croatia and in the world;
 - Modelling and assessing work methods in teacher education;
-

- Evaluating the teaching effects in teacher education (learning outcomes);
- Research on teachers' attitudes;
- With regard to the correlation between the research topics in kinesiological education and other sciences, interdisciplinary research can also be conducted in collaboration with related scientific and research institutions. In this regard, there is a possibility of forming new directions in research.

P.1.5. RESEARCH IN THE FIELD OF ECONOMY AND MANAGEMENT OF SPORT

The mentioned research field is directed towards analysing different indicators of sports development with the aim of demonstrating its economic importance. One of the main challenges in various sports organizations is the increasing need to generate income from the so-called non-budgetary (market) financing resources. This inevitably requires understanding the functioning of the market and all its regularities, and therefore the mentioned research aims at obtaining insight that shall assist sports organizations in accomplishing better business, as well as sports results. With regard to the importance of tourism for the economy of the Republic of Croatia, research on the role of sports in the development of tourism is of particular importance.

Objective: to gain new insight on the economic importance of sports, management of sports organizations and importance of sports for the development of tourism.

Research topics:

- Position and role of sports in the economy system of Croatia;
- System of sports organization;
- System of sports financing;
- Household expenses on sports;
- Analysis of various sports organizations depending on their legal status, financial treatment and management;
- Various microeconomic analyses, such as analyses of expenses, resources, performance indicators, etc.;
- Development of sports management;
- Specificity of sports management (and managers);
- Application of strategic management activities in the field of sports;
- Organization and economic effects of (major) sports events;
- Entrepreneurial programmes in sports;
- Marketing management in sport;
- Development of sports tourism;
- Economic effects of sports development in tourism.

P.1.6. RESEARCH IN THE FIELD OF KINESIOLOGICAL RECREATION

Research in the field of kinesiological recreation shall be directed towards three basic areas: professional work, leisure time and tourism. Research on professional work include determining the effects of recreational activities on productivity and quality of life of employees, reduction and elimination of acute and chronic fatigue in employees in different professions and stress management. Research on leisure time shall be based on studying the effects of recreational programmes on health and quality of life, as well as on evaluating the effects of different programme methods of recreational programmes on physical abilities and health of the general population, which also includes prevention of various disorders caused by the modern lifestyle. Croatia has the preconditions to establish year-round business based on active rest for tourists by offering quality and adequate activity programmes. Research in tourism are directed towards determining the effects of recreational programmes on the prolongation of the touristic season, satisfaction level after visiting a tourist destination, as well as on direct and indirect economic results. Research methods in kinesiological recreation are based on determining the preconditions for introducing a programme of kinesiological recreation in various conditions and for different needs.

P.1.6.a. Research on professional work

Objective: to gain new scientific insight in relation to the effects of recreational programmes in the professional work of persons of different age, health condition and various types of work positions.

Research topics:

- Studying the effects of sports and recreational programmes on work efficiency, satisfaction level with the work place and working elan of employees;
- Applied research on the effects of recreational exercising before, during and after working hours in relation to the health of employees with different types of professional load;
- Applied research on the effects of recreational exercising on acute and chronic fatigue;
- Studying the effects of recreational exercising on management of stress caused by a specific type of working environment;

- Studying the effects of corrective recreational programmes on the prevention of acute and chronic health conditions caused by the working environment;
- Evaluating interventions for promoting recreational physical activity within the work place;
- Development research on introducing modern technologies in the work process with the aim of increasing physical activity and performance efficiency of employees.

P.1.6.b. Research on leisure time

Objective: to gain new scientific insight on the effects of recreational programmes on health and quality of life.

Research topics:

- Studying the effects of sports and recreational programmes from the aspect of health, psychological, social, ecological and economic benefits;
- Determining the criteria for applying different types of kinesiological programmes for prevention;
- Determining the criteria for diagnostic procedures for persons of different age, health condition and habits;
- Studying the guidelines of recreational physical activity in different populations;
- Evaluating interventions for promoting physical activity in the community;
- Studying transformational sports and recreational programmes with the aim of obtaining new knowledge on the effective planning and programming of recreational exercising.

P.1.6.c. Research on tourism

Objective: to gain new scientific insight on the effects of recreational programmes on tourists and tourism.

Research topics:

- Assessing sports and recreational programmes and activities in tourism;
- Evaluating the effects of recreational programmes on tourism satisfaction with a tourist destination;
- Examining tourist offers and tourist demands with the aim of enriching the tourist offer with sports and recreational activities;
- Determining direct and indirect economic effects of recreational programmes in tourist destinations.

