P01 - Theology as a Way to Interpret History and Culture

The programme is based on two principles. Firstly, the theological faculties involved in the programme intend to coordinate their research activities with the aim of demonstrating their relevance. And secondly, it is not their intention simply to do research "in their own back yard", but instead to show how theology "reads" its own tradition in interaction with the culture it finds itself in, how it "reads" Czech history and the impact of the "Christian code" on it, and how it "reads" current cultural-religious antagonisms. With this broadly-based programme the theological faculties plan to enter into the plurality of interpretations of the historical and cultural phenomena of the milieu of our civilization, and to contribute to a deeper understanding of them which will overcome superficial antagonisms.

Within the framework of this broadly formulated programme, the individual faculties have specified the focuses of their research as follows: the Protestant Theological Faculty will concentrate on the hermeneutics of the Christian tradition, in particular the Czech Protestant tradition, in the cultural history of Europe, with the aim of creating preconditions not only for a better understanding of the phenomena that are being examined, but above all for practical mutual understanding among various cultural, spiritual and religious traditions in Czech and European multicultural society. The Catholic Theological Faculty has entitled its research focus "Christianity as the Code of European Culture", which requires an interlinking of knowledge gained from theology, philosophy, art history, literature, and history into an overall picture of spiritual culture and expressing the trends in its development and its dynamics. The Hussite Theological Faculty has defined its theme as "Confessionality and Nationalism"; in so doing it touches on a burning current issue – the need to remove the antagonisms preventing European integration and dialogue between confessions and cultures.

Within the framework of the programme it is planned to hold joint conferences on the individual themes, to stabilize the research teams by inviting young researchers (doctoral students) to join, and eventually to create a single joint research programme.

P02 - Environmental Research

"Environmental Research" is a truly interdisciplinary programme that connects research from several faculties and research centres of Charles University. It includes specialists from many fields of science and humanities including ecology, geology, chemistry, pedology, hydrology, atmospheric sciences, related fields of medicine, economics, sociology, law, didactics, political science and other related disciplines. The aim of the programme is to improve our understanding of individual components forming the environment and their interactions with each other and with human society. This also creates a basis for solving practically oriented problems related to environmental policy and regulation, management and environmental education.

The programme combines recent advanced methodical approaches in the study of biodiversity, ecosystem processes, abiotic environments and the interaction of human society with the environment. It is crucial to explore these phenomena and processes on various spatio-temporal scales and to focus on interactions among processes that operate on these spatio-temporal scales. Cooperation between science and the humanities creates a good opportunity for the development of combined methodical and methodological approaches. These include the use of high-tech approaches to studying biodiversity and natural processes including the flow of matter and energy in ecosystems, tracking of pollutants and other relevant components using sophisticated analytical approaches, advanced statistical tools and mathematical tools including various tools of mathematical modelling, geographic information systems, data mining and other mathematics-driven approaches applied to both natural and social systems and their interaction. This is combined with the implementation of sociological data, sociological and economic analysis, and the implementation of various scenarios of the development of human society. These analytical approaches are then reflected in recommendations for policy, education and legislation.

P03 - Improvement and Support of Psychological Sciences

The programme “Improvement and support of Psychological Sciences” is focused on the identification and rectification of weaknesses in teaching, research and clinical practice at Charles University. The second aim of the programme is to create an integrative concept and framework in psychology that can support collaboration and networking in this field. The third general aim is to define and establish particular strategies and tasks for the improvement of selected
cross-institutional areas/topics in psychology in theory and empirical research. The programme addresses the current situation at different faculties of Charles University: different approaches to similar issues, different standards of technical equipment and facilities for research, different strategies and approaches to building research capacities and human resources management, and a low degree of mutual collaboration and motivation for networking and creating joint research and education programmes at Charles University and elsewhere.

The programme is based on the identification of existing overlaps where it would be possible to open discussions on how better to interconnect and support joint activities and collaboration between our institutions. We have three priority areas: theoretical psychology and methodology; clinical psychology; prevention of risk behaviour and counselling. The programme tasks and aims reflect the existing needs and capacities of the participating institutions at Charles University with respect to the fact that most of the teams at these institutions are also involved in other ongoing projects and programmes.

The programme aims to create a theoretical and methodological superstructure that can support research and teaching activities and act as a foundation for our outputs in all basic areas of interest – clinical practice (diagnostic tools, norms, counselling centres, preventive interventions etc.), education and training (new programmes, innovative approaches in training activities, textbooks, e-learning etc.) and research (papers in prestigious journals, monographs, conferences, seminars etc.).

**P04 - Institutional and Normative Transformations of Law in the European and Global Context**

At the beginning of the 21st century law is undergoing transformations which are significantly altering its form and also affecting its relation to the state. These changes manifest themselves e.g. in the multicentrism of lawmaking (on national, European and international levels), in the transition from a hierarchical to a network-based organization of legal norms, in the growing role of economic globalization and the need for national and transnational regulation of economic processes, in the judicialization of law (the growing role of courts on the national and international levels), and in the prioritization of human rights and the related under-prioritization of legal duties. The causes, manifestations and outcomes of these processes need to be examined together with their interactions with social relations and the conditions in which the law operates.

It will thus be necessary to examine the scope of the functioning of law (in relation to other normative systems), its methods of operation (including causes of the acceptance of law), its formation (changes in the process of legislative lawmaking, the growing significance of the judicial construction of law), the restructuring of legal liability regimes (namely the range of sanctions and the widening of criminal liability), changes in the relations between private and public law, and legal and non-legal modes of stimulating the behaviour of others.

In this context attention shall also be paid to the transformation of the functions of the state, as well as the relations among institutions and entities on the state, regional/local, international and supranational levels (including the European Union first and foremost). Transitions also occur at the level of international law, which is changing from an inter-state (state-centric) system to a transnational legal order with the growing influence of non-state actors.

An important task will be the analysis of the constitutional system of the Czech Republic (in the context of the constitutionalization of international law) from the standpoint of its effectiveness in terms of the rise of attributes of the (postmodern) deconstruction of the modern conception of norms, institutions, principles and values, on which law was hitherto based.

**P05 - Private Law in the 21st Century**

The Czech legal order has experienced substantial changes relating to, and resulting from, the adoption of the new codification of private law. These changes will affect the whole of society, as both public and private individuals and legal entities will have to deal with them in their everyday transactions. The new regulative framework will bear upon all spheres of private life; in particular, it will directly determine and govern civil, business and family relations including those with international elements. In addition, it will have a direct impact on all other relations of a private nature, whether relating to copyright, employment, or other spheres.

The primary focus of the research will be on what we currently denote as the object of civil law, namely general private law. Researchers will concentrate on essentially all “branches” of private law in a proportionate manner; this will include both the codification which is valid and effective today and also the newly adopted codes which are part of valid legislation but could be designated as *lex ferenda*, as they become effective next year.

One of the purposes of the programme is to produce an analysis of new, or reinstated, institutions of private law including proposals for their application in judicial practice and well-grounded recommendations for how domestic and foreign case law may be employed in this respect.
The aim of the programme at a more specific level is to focus on such issues which arise from the new codification and which will be subsequently raised in practice during the course of adjusting to, and applying, the new integrating code. In this context, the objective of jurisprudence is to consider unclear issues, to clarify the sense and substance of new legal constructs, and to seek purposeful and just interpretations of the new institutions and concepts.

**P06 - Public Law between Europeanization and Globalization**

The process of Europeanization and globalization apply to public law primarily through normative mechanisms (mainly the legal order of the EU); national legal systems are compelled, whether directly or indirectly, actually or potentially, to absorb them. The case law of the Union’s courts, as well as of the international judicial institutions of some international organizations, enhances the role of judicial precedents. In consequence of Europeanization and globalization, the branches of public law have been subject to many changes, frequently resulting in a certain “neutralization” of the Czech national legal order. The extent of neutralization in the branches of law where a substantial portion of national powers have been delegated to EU institutions (financial law, administrative law) is different if compared to other legal branches where the Czech Republic has retained its sovereign powers, particularly in criminal law. In relation to the process of Europeanization and globalization, we analyze the grounds for neutralization and its impact upon national public law under the influence of global regulatory measures (e.g. within financial markets). So-called “legal transplants” have been formed as a substantial consequence of Europeanization and globalization; these are legal concepts and institutions of foreign legal orders penetrating national legal orders as a result of those processes. In 2012, individual branches of public law created a list of such legal transplants in Czech law; they will be subject to analysis in the following years. Emphasis is laid on concepts and institutions linking different branches of public law. Legal mechanisms for settling the debt crisis can be given as an example, as this concept connects constitutional law, European law, financial law, administrative law and social security law. In 2012, analytical outcomes were produced in this area in cooperation with PRVOUK 04. The outcomes were applied in practice in the formulation of the Czech position with respect to the Treaty on Stability, Coordination and Governance in the Economic and Monetary Union.

An important part of the programme includes ethical issues of the relation between public law and the performance of public authority. The basis for the research in this area was laid in 2012 (professional and political pre-requisites of public administration, independence of authorities and independence of officers, discretion vs. correctness, consistency and transparency, effectiveness of work, responsibility and politicization of responsibility). The first diagnostic outcome will be available in 2013.

In addition to the above-mentioned cooperation with PRVOUK 04, we are also cooperating with the PRVOUK 05 programme in order to determine a more precise delineation of the changing borders between public and private law. Private law is not conceived in the new Civil Code as a tool for governing society but as a guarantee of the free creation of private life so that the widest space possible is preserved for the free initiative of an individual. The autonomy of will of an individual emphasizes the individualistic basis of private law in opposition to the social character of public law.

**P07 - Psychosocial Aspects of Human Quality of Life**

This programme can be seen as an interdisciplinary programme, representing human sciences from several key perspectives in terms of social changes and trends, and monitoring several specific aspects of human society (health, lifestyle, delinquency, etc.) in a transitional period in which the social paradigm is changing. Furthermore, the research addresses the perspective of the individual and his development in society, how he perceives reality and the meaningfulness of life, and specifically how he experiences ongoing social changes and how he deals with them. Areas of application for the research include applied psychology, psychiatry and social work, where societal changes have the most important impacts on an individual.

By approaching the issues via a variety of different yet complementary disciplines, the programme offers a unique insight and is fully in line with global trends towards interdisciplinary research.

The programme focuses on both research and application; it ranges from exploratory analyses to the employment of an interdisciplinary perspective and the eventual application of the research findings in a social context, focusing on the areas of prevention and intervention. This approach can already be seen in the previous research and publication activity of the departments involved.


This programme involves three faculties (the Faculty of Arts, the 2nd Faculty of Medicine and the Faculty of Social Sciences), five disciplines (psychology, psychiatry, sociology, methodology, social work) and five different departments (Faculty of Arts - Department of Sociology, Department of Psychology, Department of Social Work; Faculty of Social Sciences - Department of Sociology; 2nd Faculty of Medicine - Department of Psychiatry).
P08 - Oriental Studies
The study and research of Asia at the Faculty of Arts has a respected tradition reaching back around 150 years. The individual fields of study rooted in the philology of major languages of these regions represent complex interdisciplinary research on languages, literatures, societies, histories and cultures from the perspective of their historical development and modern situation.

The individual research projects each focus on one specialized field of study or method with an interdisciplinary perspective. Besides the study of the primary sources, which is an important component part of the research in all regions, we also place emphasis on direct contact with the studied territory, field work and practical knowledge of the region in question. The individual fields of study concentrate on characteristic and dynamically developing aspects of the languages, societies and cultures of Asia. Knowledge of languages and of the relevant “terrains” is an essential precondition for approaching the rich cultural heritage of these countries and for acquiring a good orientation in current events.

Besides their research activities and the production of new knowledge, our specialists also reach out to the general public and provide relevant and up-to-date information about the societies, histories, literatures and cultures of Asia to members of the public. They also prepare scholarly translations of the original literary works and offer informed analyses of the current situation in the individual regions. In our programme we stress the interconnectedness of teaching and research, which is evident from the fact that talented Master's students and especially PhD students also take part in our research activities. Visiting lecturers and professors from our target countries as well as partner European universities further contribute to a high standard of teaching and research.

The importance of research on Asia is growing with the increasing role of this continent on the world stage. Complex knowledge of the individual regions, including excellent knowledge of their languages, facilitates a new insight into the problems of the regions in question and helps us to understand the transformations taking place there. It further contributes to the development of relations between the Czech Republic and these countries. Another important aspect is our international cooperation, both within Europe and other Western countries and also with scholars in our target countries. Our work is well received in the countries of our professional interest, which generally contributes to a positive image of the Czech Republic in these countries.

P09 - Literature and Art in Intercultural Relationships
The programme is designed to integrate literary, artistic and historical disciplines at the Faculty of Arts by studying the functions and transformations of art and media in a broader historical, national and international socio-political context. This primary research is supplemented by applied research activities which include editing and translating the studied texts in order to make them available to the Czech academic public. The programme is focused on several major problem areas including cultural identities, multiculturalism and canons as well as popular, trivial and commercial literature and art. Other important areas are the relationships between literature and technology or utopias, the links between literature and visual and performing arts, and interactions between literature and the political power of totalitarian regimes. The principal cultural regions explored are Central Europe and English-speaking countries.

The programme is based on close cooperation among academics and PhD students and builds on the results of previous successful research projects including "Tradition and Multiculturalism in the English-Speaking Countries" and "A History of Modern Literature in Supranational Context" (both under an umbrella project "Foundations of the Modern World Reflected by Literature and Philosophy"), and the output of the "Research Centre of the Czech Avant-Garde".

P10 - Linguistics Programme
The content of the programme reflects the breadth of interests of the participating partners. Departments and institutes concerned with linguistic disciplines at the Faculty of Arts are among the oldest in the Czech Republic. At the same time they are the most distinguished ones of their kind in the Czech Republic, boasting extensive research activities and prestigious publications issued in the Czech Republic and abroad. They often function as the country’s standard-setting and training centres, with their graduates subsequently working as specialists in most other Czech universities. In this sense the role of the Faculty of Arts is irreplaceable within both Charles University and the whole of the Czech higher education system.

The number of studied languages and the wide-ranging theoretical and methodological stances make the Faculty the most comprehensive linguistic research institution in the Czech Republic. Due to the diversity of the participating (general and special linguistics) departments and institutes, the programme includes components that cover most of the key aspects of language research. These components are representative of four complementary levels/perspectives of approach: (a) theoretical – applied; both viewed from the (b) general – specific perspectives where the object of research is either language as such (general linguistics) or particular languages (European and non-European, studied in a contrastive or comparative manner); (c) synchronic (from (neo-) structuralist and functional positions) – diachronic (focusing on the historical background of language phenomena and their development); and finally the (d) intradisciplinary – interdisciplinary perspectives (the latter involving linguistic research within a broad socio-cultural context, involving different language communities and situations etc., and in various psychological, contact,
functional, or communicative, settings with the collaboration of such disciplines as sociolinguistics, psycholinguistics, corpus linguistics, etc.).

The Linguistics Programme is conceived so that its research outputs take into account the requirements of EU language policy and its implementation, whether including outputs in the applied sphere (language management, Translation Studies, lexicographic and didactic projects) and that of specialist language education and preparation which contribute to the fulfilment of the framework strategy of multilingualism, one of the key priorities of EU language policy, or outputs in the theoretical sphere, bringing to light the wider theoretical context and perspectives of this policy.

P11 - Czech National Corpus

The primary objective of the Czech National Corpus (CNC), launched in 1994 at the Faculty of Arts, is to build language corpora, i.e. large text databases which serve as a basis for basic as well as applied research. The CNC strives to continuously map and monitor the Czech language, its variability and development. CNC activities can be divided into two interdependent parts. Since 1 January 2012, the first part of the CNC programme (building of corpora, their publication and improvement, and related professional services and technical support) has been carried out within the framework of a major five-year infrastructure project funded by the Ministry of Education, Youth and Sports. The second part (the methodology of corpus mining and analysis, as well as linguistic mapping of Czech, its variability and development, based on corpus data) is covered by the PRVOUK programme (Czech National Corpus – P11).

The PRVOUK programme is focused on further promoting and enlarging as well as deepening corpus linguistic research of the Czech language in all its varieties. It focuses principally on basic research, though it also includes work on methodological issues and the production of applied outputs, such as dictionaries, grammar books, linguistics publications, monographs and papers etc. By building an ever larger database, the programme strives to extend linguistic research possibilities into areas which have not previously been available for corpus research.

With the continuous growth of the CNC database, the question of how to use it as effectively as possible is becoming more and more important. The corpora of synchronic written Czech comprising 1.3 billion words provide a solid basis for the research of various linguistic phenomena; researchers predominantly focus on lexicology (collocations, phraseology, and terminology) and text (discourse analysis, stylometrics). Thanks to the unique research data in the corpora of spontaneous spoken Czech (3 mil. words), it is possible to examine characteristic features of spoken discourse (from the lexical, morphological, syntactic, or sociolinguistic perspectives) and to compare them with the properties of written texts. Seen from a long-term perspective, the programme also focuses on diachronic research; the DIAKORP corpus maps the development of Czech from the 14th to the 20th century. It also focuses on the modern diachronic perspective (from the 1990s up to the present day). Special attention is given to contrastive research based on the InterCorp parallel corpus (139 mil. words) consisting of Czech texts aligned with their translations in different languages.

The CNC corpora and research results are also used in university teaching: they provide valuable data which have resulted in a number of papers and theses at Bachelor’s and Master’s levels, as well as doctoral dissertations.

P12 - History in an Interdisciplinary Perspective

The goal of this interdisciplinary programme is to strengthen research in the historical sciences and related disciplines. The long-term aim of the programme is to contribute to the position of Charles University as a leading institution for historical research in Central Europe. The programme is rooted in the particularly strong tradition of historical research at the Faculty of Arts. At the same time it works with the latest research approaches in the field and considers the impact of globalization.

The main aim of the programme is to examine the relationship between evolutionary and conflict models of human action in history as well as to answer the question of the extent to which historical actors are able to learn from history – both from their mistakes and from their achievements. The historical conception of a human as both an individual and a collective being who seeks his "happiness" in various social situations serves as a conceptual "bridge" unifying the entire programme. The research thus aims to capture interactions among analogies in historical processes and the diversity of values based on culture.

The Faculty of Arts is an umbrella institution for a variety of historical disciplines which are systematically studied at its various institutes and departments. Those disciplines, together with interdisciplinary fields such as Ibero-American Studies, Balkan Studies and Central European Studies, create a complete corpus which benefits from mutual research cooperation. The interdisciplinary character of the programme stems from this conceptual and organizational context. The programme focuses on the following traditionally strong research areas in historical science at the Faculty of Arts: thematically and chronologically oriented research of historical resources, political, social, economic and cultural history, comparative history, studies of nationalism and area studies.

Another important aspect of interdisciplinarity within the programme stems from the coordination of methods of historical disciplines with methods and theories from different fields such as social sciences, political science, psychology, aesthetics, cultural anthropology and economics.
Philosophically, the inspiration for the programme draws from its emphasis on "historicity" and "temporality". It seems apparent that we cannot simply apply social and cultural conceptions to the study of historical phenomena; we also have to travel in a reverse direction, contextualize human actions and explain social and political processes in terms of their relations to the turning points in history and the often ambivalent impacts of human actions. The research within the programme thus aims at providing an analysis of national and cultural identities in the diachronic perspective. Particular events are carefully analyzed while observing regularities as well as changes in human action and communication, in social institutions and relationships, and in power structures.

The programme is divided into following modules:
A. Sources, Culture and Communication in Czech History
B. Society, Culture and Communication in Czech History
C. The Czech Lands as an Open Space of Distinctive Historical Experience in Europe from the Early 18th to the 21st Centuries
D. Europe and (versus) the World: Intercontinental and Intracontinental Political, Economic, Social, Cultural and Intellectual Transfers and their Consequences
E. Shaping – Assimilation – Coexistence – Integration – Reflection (Development of Linguistic, Confessional, Ethnic and National Identities in Eastern and South-Eastern Europe)
F. Formation and Development of National Identities in Central Europe in the 19th and 20th Centuries

P13 - Rationality in Human Sciences
Research in contemporary philosophy builds upon two traditions – continental philosophy and the Anglo-Saxon tradition, which stresses the study of language, logic and epistemology. There still exist two approaches within the inner structure of the field: historic and systemic, which complicates matters. Difficult as it may seem in both cases to synthesize the two concepts, it is necessary to look for common bases and intersections. It is clear that the philosophical approach at the Faculty of Philosophy cannot pay exclusive attention to only one direction in contemporary research: our broad-based international cooperation and our tradition forbids it. This is why the Programme strives to determine topics that allow for dialogue and cooperation. In a way it is possible to determine them quite precisely, as the Programme follows on from the results of the 2005-2011 research programme funded by the Ministry of Education, Youth and Sports: "Foundations of the Modern World as Reflected in Literature and Philosophy", as well as from the results of grant-funded research at the Institute of Philosophy and Religious Studies, Faculty of Arts ("Logical Bases of Semantics" 2009-2012, "Order of Knowledge, Order of Morality and Order of Community in the Philosophy of Plato" 2011-2013).

The Programme, drawing from this research, delimitates themes in which different traditions, courses and approaches can meet, and which are important for the cultivation of philosophy in the present times. Indeed, it is anticipated that their significance will grow over time. The stress is on different forms of the critical rationality which is characteristic of all fields of the humanities (although they work with different methods). The Programme is divided into three modules. Each, within the framework of one specific tradition, deals with problems also dealt with by other traditions. This is done in a way that allows the solution to become a basis for cooperation with other traditions. The goal is to create a firm basis on which to cultivate philosophy - however internally differentiated it may be. The premise of the internal division of the Programme is communication not only across modules but also across the specific sections. The division is according to themes, and each theme accentuates a different methodological approach. The third module respects the need for interdisciplinarity as well as the fact that philosophy is a mode of knowledge that must be confronted with the approaches of other disciplines. This module should therefore function to communicate across the boundaries of philosophical discourse.

P14 - Archaeology of Non-European Regions

The aim of the programme is to support the long-term research and teaching activities of the Czech Institute of Egyptology at Charles University in order to ensure the continued exploration on the archaeological concessions at Abusir (Egypt), the Egyptian Western Desert and Sudan, and to support the further development of theoretical Egyptian research and the exploration of complex civilizations at the Institute’s workplace in the Czech Republic. The research team will be engaged in the exploration of the civilization of ancient Egypt above all based on the acquisition of original sources through its own archaeological research and their subsequent interpretation, including the investigation of the relationships between Egypt and the neighbouring areas of the ancient Near East and North Africa. On a more general level, the investigation will concern theoretical generalizations of the explored phenomena and processes in terms of the development of complex societies in the Holocene.

Based on the clearly defined and internationally respected profile of the Czech Institute of Egyptology (i.e. the search for and interpretation of sources related to the history of the oldest Egyptian state), further projects of basic research will be implemented, aiming specifically at the investigation of the social, economic, political, cultural and religious history of ancient Egypt in the 4th, 3rd and 1st millennia BC.
Within this programme, ancient Egyptian society is understood within its broader cultural, natural and historical context, because the development in Egypt itself influenced the situation in the entire area of the Near East and north-eastern Africa in antiquity. The analysis and interpretation of the material acquired in this way and from a long timespan provide us with unique information that can contribute to our knowledge and analysis of processes characterizing our current civilization and its development.

The acquired sources and knowledge will contribute in a decisive way to our better understanding, and often to a radically different interpretation, of the rise and development of science, crafts and art and the integration of ancient Egyptian civilization into the socio-cultural development of the wider territory of North Africa, the eastern Mediterranean, and the Near East.

**P15 - Schools and the Teaching Profession in the Context of Increasing Demands on Education**

The programme is thematically structured into six areas dealing with (1) the transformation of schools resulting in new demands on teachers, focusing on their preparatory and follow-up lifelong learning; (2) the efficacy of school education and assessment of its efficacy in the local and international context, focusing on desirable innovations; (3) children and teenagers (pupils and students) in relation to the changing structure of influences affecting their development, focusing on creating an environment conducive to meeting the educational requirements of school education; (4) people with special educational needs, i.e. people who are disadvantaged in various ways, focusing on their inclusion into mainstream education; (5) upbringing and education with respect to value orientations, focusing on personal moral development; (6) educational policy, focusing on the availability of high-quality education as a factor of social integrity. Each of the above-mentioned areas is explored both individually and in interdisciplinary terms.

Besides the Faculty of Education, other faculties of Charles University have joined the programme as well – namely the Faculty of Arts, the Faculty of Science, the Faculty of Mathematics and Physics, and the Faculty of Physical Education and Sport. The programme seeks to explore the theory of school, school education and its participants taking into account the findings in terms of their application and innovations.

**P17 - Sciences of Society, Politics, and Media under the Challenge of the Times**

The programme aims to perform highly qualified research into the social and political dynamics of the contemporary world, based on international standards and interlinked with the development of individual social scientific disciplines and inter-disciplinary cooperation. The Faculty of Social Sciences is suited to such an aim, as has been demonstrated by the course, results and evaluation of the research project from 2005-2011, which launched this trend. The development of disciplines and the encouragement of inter-disciplinary cooperation will materialize within the boundaries outlined in the table below:

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<tr>
<th>Core sciences</th>
<th>Political Science</th>
<th>Sociology</th>
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<tr>
<td>Cross-sectional disciplines</td>
<td>Area Studies</td>
<td>Public and Social Policy</td>
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The programme will of course also address other related disciplines, primarily in the sphere of economics, law, public administration and modern and contemporary history.

As regards the content of the programme, it aims to: 1. Identify significant challenges, opportunities and threats emerging within Czech, European and global contexts; 2. Explore the behaviour and interests of agents who face them within the transformation of politics, territories, administration and communication; 3. Cultivate corresponding theoretical bases and methodological tools.

A fundamental pre-requisite for the programme to work is the stabilization of the research team at the Faculty in terms of human resources, qualification structure and finances, based on cooperation among senior academics, postdoctoral and doctoral scholars, selective support by teams and researchers achieving excellent results, and effective management of the programme.

The organization and management of the programme reflects the effective cooperation of the programme council and coordinator with the heads of individual workplaces and the universal support of the Faculty apparatus.

**P18 - Phenomenology and Semiotics**

The research focuses firstly on contemporary continental philosophy, specifically phenomenology, hermeneutics and philosophical anthropology. Secondly, it involves semiotic research drawing on continental resources (post-structuralism, visual studies) as well as Anglo-Saxon domains of research, such as theories of communication, linguistics and urban anthropology.
The philosophical aspect of the programme predominately consists in phenomenology and philosophical anthropology. It examines principal questions such as the relations between rationality and sensibility, subjectivity and corporeality, life and mortality, the “givenness” of the world, the nature of phenomena, disclosure and the constitution of space and time. Associated fields of research include the interrelations of action, creativity and rhetoric in areas such as ethics and politics, but also in the philosophy of art and aesthetics.

Semiotic research focuses on post-structuralist approaches to the analysis of signs and communicative processes. The research examines the evolution of communication types caused by the new technologies. The aim is to establish a philosophical basis for research with regard to the character and processes of communication ranging from linguistics and anthropology to cognitive science. Major fields of interest include the relation between representation and interpretation, forms of authorship and creativity in new media, the transformation of urban space, and technologies of power and their impact on contemporary society.

Also associated with the programme is an emerging contemporary discipline concerned with examining the hermeneutics of ancient and medieval texts. This is an interdisciplinary area of research working in conjunction with philology, philosophy, the history of the intellect, religious studies, manuscript studies, etc. It focuses specifically on religious texts. In addition, the programme will integrate and develop further research in digital philology.

P19 - Interdisciplinary Social Sciences
The following fields and problem-oriented interdisciplinary specializations are involved in this programme: the sociology of knowledge, institutions and organizations, gender studies, civil society and third sector studies, the study of management and supervision in social and healthcare organizations. The aim of the programme is to support the development of a set of interdisciplinary specializations in the social sciences and humanities that have not yet become firmly established at Czech academic institutions. It is also designed to create a flexible framework for integrating other emerging interdisciplinary specializations focused mainly on the study of current transformations in knowledge, culture, and society. Basic research themes include: the crisis and reconstruction of modern institutions; the social dimensions and impacts of expert knowledge in general and, in particular, of social sciences and humanities; the reproduction and transformation of the gender order; social innovation and the social economy; new forms of civic participation and collective action; management processes and cultural dynamics in organizations.

The content of the programme reflects efforts to integrate approaches in the social sciences and humanities and to attain a balance between basic and applied research. It includes research projects that are aimed at the application of knowledge in such fields as the third sector, the social economy, gender equality, and the management and supervision of health and social organizations. The results can be applied by public administration, international and global organizations, the third sector, the corporate sphere, and the public.

P20 - Cultural, Social and Historical Anthropology
The programme draws on the findings of the research project No. MSM0021620843 (“Anthropology of Communication and Human Adaptation”) and also on current research in the field of general anthropology (especially in such subdisciplines as behavioural, historcal, cultural and social anthropology), historical sociology and gerontology.

The programme aims to create a space for the analytical and interpretative interconnection of various approaches to the study of human existence (drawing on humanities, biology and medicine).

The research addresses forms of human behaviour, (social) action and cognition. Interest is focus not only on the determinacy of species (as part of the process of hominization), but also on their historical, cultural, social, generational and group conditionality and variability.

Attention will be paid to the categories of memory (personal and group), consciousness and identity, and also to the domain of interpersonal relations and relations between personal and social systems. The research will be concerned with the connection of these aspects with phenomena such as creativity (including its artistic aspects), as well as their adaptability and evolving transformation.

In addition to theoretical analysis, the research will also apply qualitative (interpretative) methods, empirical methods and quantitative analytical methods. Individual studies will draw on methods of biological, behavioural-evolutionary, philosophical, cultural and social anthropology, historical sciences, historical sociology and medicine (i.e. gerontology).

The programme will interconnect the approaches of these disciplines in an interdisciplinary way. It will thus fulfill one of the essential aims of this programme: to do anthropological studies on the boundaries between “nature” and “culture”. The other important aim of the programme is to study the correlations between cultures and their subcultures, including the mechanisms, processes (of marginalization), and origins of these subcultures. Another significant aim of the programme is to study the correlation between the behaviour, actions and cognitive ability of individuals and sociocultural systems from the perspective of their historical transformation.

P21 - History of University Science and Education
The programme has been designed in accordance with the Long-Term Plan of the Institute of the History of Charles University and Archive of Charles University. One of the key intentions of this plan is to promote collaboration with other institutions which focus on similar subjects. In this particular programme, experts from the Institute of the History of Charles University and Archive of Charles University will cooperate with specialists from the Institute of the History of Medicine and Foreign Languages at the 1st Faculty of Medicine. The programme focuses on the history of the Prague university and other Bohemian and Moravian universities, taking into account a broad chronological span but emphasizing the period from the Early Modern Era up to the present day. University history (i.e., the history of the institution as a whole and of its constituent parts, the history of academic disciplines, the history of the student body, the impact of the university and the position of academically educated individuals in society) will be analyzed in a broader context of social, cultural, and political history. A comparative method will be used especially in studying the development and function of Central European universities during the era of national, political, and ideological conflicts in the 19th and 20th centuries. In this work, we will also rely on our tried and tested collaboration with universities in Leipzig, Krakow, and Vienna. The academic team at the Institute of the History of Medicine and Foreign Languages has been successfully cooperating with specialists from the Institute of the History of Charles University and the Archive of Charles University on various projects related to the history of medicine and medical faculties for a number of years. The current team includes more experienced researchers as well as representatives of the younger generation.

Ultimately, the research should result in the creation of a new, comprehensive, and easily navigable history of Charles University, which would (especially in terms of methodology and interpretation) further elaborate and supplement the History of Charles University I-IV (published by the Institute for the History of Charles University and the Archive of Charles University in the Karolinum Press, 1996–1998). Specialists from the Institute of the History of Medicine and Foreign Languages will not only collaborate on the overall project of researching the history of Charles University, but will also create a biographical dictionary for the period 1945–2008 and publish specialized monographs.

**P22 - Theoretical Study of Complex Phenomena**

The long-term research programme of the Centre for Theoretical Study (CTS) is devoted to the study of phenomena that, due to their complexity, overreach the conceptual frameworks of individual disciplines, and thus demand multidisciplinary and transdisciplinary collaboration. Examples of such phenomena include the structure and dynamics of the biosphere at large spatial and temporal scales; the dynamics of natural and cultural landscapes and their interaction with the development of human societies; the growth of cities and the emergence of suburban space; collapses of complex systems and communities; or collective decision-making in developed societies. Our approach to the study of complex phenomena is quite unique (within Charles University as well as within the international research community), as it is not limited only to detailed explorations from the point of view of individual disciplines and the subsequent synthesis of these particular views, but also encompasses theory building, i.e., the establishment of general frameworks through which it is possible to interpret complex phenomena. We collaborate with many research groups abroad, especially in the USA and the UK, but also in other European countries. Complexity is usually studied from the mathematical perspective by means of computer simulations. Although we adopt this approach in the CTS as well, perhaps more important for us is examining the common features of complex phenomena in different disciplines. We have published many papers on these topics in renowned journals, including multidisciplinary journals such as Nature or PNAS, and several books and book chapters (published also by international publishers, e.g., Cambridge University Press or Wiley-Blackwell). The team in the CTS is characterized by transdisciplinary interests combined with a high level of expertise in individual fields of study, and is being continuously renewed by recruiting young researchers. The further development of the theory of complex phenomena at the CTS thus promises major achievements in both research and teaching.

**P23 - Economics and Finance**

The programme is run jointly by Charles University’s Centre for Economic Research and Graduate Education (CERGE) and the Institute of Economic Studies (IES) at the Faculty of Social Studies. It aims at (i) providing financial support to teams engaged in research in the fields of economics, econometrics and finance, and (ii) utilizing institutional funding to enhance the quality and further the development of these fields at Charles University.

The programme aims to support the publication of high-quality research in renowned general and field-specific journals, developing closer cooperation among senior and junior researchers from both institutions and fostering further cooperation with workplaces worldwide.

Despite the strict financial constraints imposed by the inadequate funding rules applied at Charles University, CERGE and IES have nevertheless managed to produce high-quality studies in several fields of modern economics and econometrics, which were published in 2012 in renowned international journals:

- **American Economic Journal: Macroeconomics (AIS 6,955/IF 3,8),**
- **American Economic Review (AIS 5,674/IF 2,693),**
- **Review of Economics and Statistics (AIS 4,397/IF 2,664),**
- **Journal of Econometrics (AIS 2,839/IF 1,349),**
- **Economic Journal (AIS 2,715/IF 1,945),**
- **Europhysics Letters (AIS 1,173/IF 2,171),**
• Energy Economics (AIS 1,139/IF 2,344)
• Journal of Economic Dynamics and Control (AIS 1,091/IF 0,855).

This represents a unique achievement in publishing within the field of social behavioural sciences (economics, sociology, psychology), which is unprecedented in the Czech Republic.

Within the framework of Charles University, CERGE and IESalso cooperate closely in (i) financing doctoral research via the GAUK (Charles University Grant Agency) system, (ii) the “Centre for Advanced Economic Studies” project (a University Research Centre within the UNCE scheme), and other informal activities and projects (e.g. in the Czech Science Foundation Centre of Excellence, doctoral studies, joint teaching and contractual cooperation in accredited programmes, etc.).

P24 - The Molecular, Cellular and Pathophysiological Basis of Diseases

The aim of the programme is to study large-scale molecular medicine in human diseases of endogenous and exogenous origin and to clarify their relevant physiological, developmental and adaptive mechanisms. Several departments and laboratories collaborate in several fields on the following topics:

1. **Inherited genetic diseases**: identification and study of large-scale genetic causes and mechanisms of rare diseases (e.g. kidney, myocardium and eye diseases); development of new diagnostic methods based on genomic sequencing; study of mechanisms in hereditary lysosome and mitochondria disorders; study of glycosylation disorders and of metabolism of iron, heme, purines and sulphur compounds.

2. **Developmental, epigenetic and adaptive mechanisms**: normal and pathological cell differentiation and proliferation including stem cells; regulation of transcription, posttranslational modification of proteins, biogenesis of microRNA; cell and tissue adaptive reactions and interactions of cells with nanomaterials.

3. **Host-microorganism interactions**: biology of selected bacteria and Protozoa; pathogenesis of distinct infectious diseases; host reactions and interactions with viruses, prions, bacteria and Protozoa.

4. **Ethical aspects** of molecular medicine, regenerative medicine, biobanking, ethical dilemmas of genetics and genomics.

The research is based on several model systems including bacteria, invertebrates, tissue cultures and mice. The programmes develop existing genomic, proteomic and metabolomic methods, including bioinformatics. They exploit the expression and characterization of normal and mutant proteins in heterologous systems, analysis of organelles, cells and tissue cultures by various methods including confocal microscopy, histochemistry, immunological and electronoptical methods and animal models.

On the national level, the programme contributes to the development of these fields and the education of postgraduate students. It forms a basis for future research and development structures at the University level as well as for the proposed National Centre of Medical Genomics. On the international level the published results will enhance our understanding of the pathophysiological mechanisms of the studied processes; some of the findings will find application in the diagnosis, treatment and prevention of human diseases.

P25 - Complications of Metabolic Disorders

The main aim of this programme is the analysis of pathogenic mechanisms and the identification of new biomarkers in complications of metabolic disorders, especially of diabetes mellitus, obesity, dyslipoproteinemias, kidney, gastrointestinal and rheumatic diseases, including osteopathies. Cross-talk of different metabolic disorders will also be evaluated. Analysis of biomarkers will be used for estimation of the risks of the development of complications, early diagnosis and the effects of treatment. In the future, the biomarkers will be used in evaluating the effects of prevention.

Four main areas will be included in this programme, with the participation of 22 different departments of the 1st Faculty of Medicine:

1. The experimental part will explore histological, developmental and genetic characteristics in the development of complications by using different biomodels with particular focus on vascular wall changes and their regulatory mechanisms.

2. The vascular complications in diabetes, obesity, dyslipidemias and endocrinopathies will be the subject of clinical research of pathogenic mechanisms with respect to the role of regulatory molecules.

3. Kidney and rheumatic disorders will be investigated to clarify genetic, immune and biochemical changes characteristic for their pathogenesis and with specific focus on the prevention of complications.

4. The interaction between man and the environment with regard to infectious and occupational diseases will bring new insights in terms of their influence on chronic metabolic disorders.

**Main outputs**: New information obtained from basic and clinical research will provide new insights into the pathogenesis, early diagnosis, treatment and prevention of complications of metabolic diseases. It will subsequently be used in clinical practice.
P26 - Neuropsychiatric Aspects of Neurodegenerative Diseases

Neurodegenerative diseases are characterized by the progressive dysfunction and eventually death of nerve cells. Because of the significant increase in their prevalence in the context of an ageing population in developed countries, neurodegenerative diseases are among the main priorities of European biomedical research. The present programme is based on collaboration between research groups from the clinical departments of Neurology and Psychiatry and associated research teams from the 1st Faculty of Medicine. The programme will study neurodegenerative mechanisms in various neuropsychiatric diseases such as Parkinson's and Huntington's disease as well as other movement disorders, Alzheimer's disease, Pick's disease and other dementias, multiple sclerosis, psychotic and mood disorders as well as other neuropsychiatric disorders.

Main topics and goals of this programme include:

• Clinical, genetic, neuropsychological, electrophysiological and functional imaging studies in neurodegenerative diseases; studies of motor, oculomotor, cognitive, and autonomous disturbances, disorders of gait and stability, and disorders of sleep in neurodegenerative diseases; collection of normative data related to physiological aging.
• Diagnostic markers and the relationship between clinical, neuropsychological, genetic, immunological and imaging parameters in demyelinating diseases. The aim of this topic is to understand the role of neurodegeneration in demyelinating diseases, improve their diagnosis and identify prognostic markers of treatment response.
• Relationships between the clinical manifestation of psychopathology and its functional and structural underpinnings at the cellular and molecular level. The goal of this topic is to discover and describe biological changes in the brain, the autonomic nervous system, biological rhythms, and the endocrine and immune systems, which accompany psychopathological processes.
• Interaction of biopsychosocial factors in the pathogenesis of neuropsychiatric diseases with a special focus on the role of traumatic stress. The aim of this topic is to study metabolic, endocrine, behavioural, cognitive, and physical changes in eating disorders, attention deficit hyperactivity disorder, personality disorders and addiction.

P27 - Complex Oncological Programme (COP)

Research area: Experimental and clinical oncology (cell biology and pathology focused on cancer cells and the cancer microenvironment, new approaches in diagnostics and therapy)

The programme represents a continuation of a previous successful programme (MSM 0021620808, 2005–2011). The COP covers basic and applied oncological research and connects theoretical, preclinical and clinical institutes from two medical schools at Charles University – the 1st and 3rd Medical Faculties. It represents the most extensive oncosurgical base in the country. The COP is closely connected with three European projects: Biobanking, GLYCOPHARM and BIOCEV.

The basic molecular/cellular mechanisms of biological programmes connected with malignant transformation, such as apoptosis, proliferation, differentiation, adhesion, migration, epithelial-mesenchymal transition, will be studied under experimental conditions. The results will be verified using clinical material of solid tumours of adult age.

A better understanding of intra- as well as intercellular regulations, including the interaction of cancer cells with stromal elements, will lead to the development of new strategies of advanced early stage tumour diagnostics and personalized therapy of malignant diseases.

P28 - Oral Diseases: Incidence, Mechanisms, Prevention, Treatment, Interactions

The programme focuses on epidemiological, clinical and laboratory research of aetiology and the diagnostics, prevention and treatment of oral diseases, with a special focus on innovative technologies and interdisciplinary approaches to both oral and general health.

The programme consists of five inter-related projects, which differ in their areas of focus, methodological approaches and outcomes.

1. Oral health of the population and the dental care system - characteristics and assessment:
   Monitoring of oral health and quality of dental care with the aim of identifying major risk indicators of dental caries and periodontal diseases; investigation of psychological and social determinants of oral health-related attitudes and behaviour of parents in relation to the prevention of dental diseases in their children.
2. Laboratory methods for monitoring of the risk factors for dental caries and periodontal diseases:
   The role of the oral microbiome in the development of cardiovascular and other systemic diseases; the immunological profile of periodontally compromised patients.
3. Physical and chemical properties of dental materials:
Investigation of novel reparative and non-invasive technologies for the treatment of initial carious lesions and dental erosion; stability of dental materials and bonding systems after exposure to different agents contained in cosmetic and prophylactic dental products.

4. Investigation of the exposure of the human body to heavy metals from dental alloys contained in materials used for restorative and prosthetic dental care:
   Immune response in patients with hypersensitivity to heavy metals with respect to diagnostics, treatment and dental rehabilitation; detection of corrosion products in oral tissues and electro-chemical markers of exposure to heavy metals in the oral environment; monitoring of occupational exposure to heavy metals.

5. Comprehensive preventive care and clinical rehabilitation of patients with oral and oro-facial diseases:
   Interdisciplinary assessment of the relationship of oral and general health disorders; impact of periodontal impairment on pregnancy with regard to its length and the birth weight of the newborn (case-control studies); testing and implementation of new diagnostic and treatment technologies for comprehensive oral rehabilitation of patients with advanced non-invasive methods for hard and soft oral tissue reconstruction and team-based approaches to patient rehabilitation.

P29 - Paediatric and Developmental Neurology Programme

The basis of the programme is a more than 40-year tradition of research into child development at the 2nd Faculty of Medicine of Charles University (Motol University Hospital). The research consists of inter-linked neuroscience programmes focusing on afflictions of the central and peripheral nervous system from newborn age, through puberty, and throughout the aging process. Currently the research involves the Clinic of Paediatric Neurology, the Neurological Clinic, the Neurological Clinic for Children and Adults and the Neuroscience Institute in cooperation with the Centre for Epilepsy, the Inherited Neuropathies Centre and the Cognitive Centre. The professional cohesion of the clinical and research teams creates a basis for a concept of applied research oriented toward both the current needs of patients and the development of innovative biomedical approaches. The programme is based both on previous successful grant-funded projects concerning early identification and intervention in serious developmental disorders of the central and peripheral nervous system and on existing and upcoming European projects. Within the PRVOUK programme, we plan, within 5 years, to achieve significant improvements in our international position and long-term sustainable competitiveness, especially by working on the following programmes:

- The epileptological programme is focused on research in the field of neuroimaging techniques (MR spectroscopy, fMRI, DTI tractography, SISCOM, FDG-PET), in the field of mathematical analysis of both scalp and intracranial EEG signals, and on the improvement of surgical techniques for patients with epilepsy (co-registration of neuroimaging tests for purposes of neuronavigation). The priority is to test the effectiveness of epileptosurgery in patients with cortical dysplasia associated with TSC and to analyze the extracellular parameters of resected brain tissue.
- The neurodevelopmental programme has recently become focused around developmental speech disorders (dysphasia); the main aim of the research is to search for clinical, functional (EEG) and structural (DTI) connections between speech centres and specific developmental changes of the connectome both in affected and healthy children.
- The neuropathic and neuromuscular programme is based at the Inherited Neuropathies Centre. It focuses on investigating the molecular-genetic causes of rare, unclassified inherited neuropathies and neuromuscular diseases.

P30 - Paediatric Haemato-oncology: Molecular Principles and New Therapeutic Approaches

The programme team focuses on translational research in the field of paediatric malignancies. The research aims to expand knowledge of the origin and development of malignant clones. The team will introduce new high-throughput genomic and proteomic techniques and will study pathological signalling, the effect of genetic aberrations, and the mechanisms of action and efficiency of commonly used as well as newly developed therapeutics.

P31 - Initial Stages of Diabetes Mellitus, Metabolic and Nutritional Disorders

In recent years, the massive development of research in the area of nutrition, diabetology and endocrinology at the 3rd Faculty of Medicine has brought large quantities of grant funding to the Faculty, particularly for two research projects focused on the above issues. Thanks to these projects, the Faculty’s laboratories have been equipped with world-class facilities and high-quality, highly productive research teams have been built; since 2005 onwards these teams have been integrated into the Centre for Research of Diabetes, Metabolism and Nutrition. The Centre now incorporates eleven laboratories and working groups. These groups have prepared both an UNCE project (the University Centre for the Study of Energetic Metabolism) and a PRVOUK programme (Initial Stages of Diabetes Mellitus, Metabolic and Nutritional Disorders).

The theme of our research is of key importance and has a social impact: in the Czech Republic there are currently 800 000 patients with diabetes and over 2 million people with obesity or significant overweight. Diabetes is the leading
cause of kidney failure, acquired blindness and non-traumatic limb amputation. Diabetes is, along with obesity and metabolic syndrome, the most important risk factor of atherosclerosis and its organ complications. About 60% of the Czech population die of these organ complications (ischemic heart disease, cerebral vascular disease and peripheral arterial disease). Many of them die prematurely, even in middle age. Today, attention is increasingly being paid to food quality. Therefore, part of our programme is focused on the composition of food, including possible burdens of toxic substances in food.

The increase in metabolic diseases is closely connected with changes in mitochondrial structure and function. The study of the mechanisms and the impacts of mtDNA damage, mitochondrial proteins and lipids is therefore one of the major areas of research into metabolic diseases. Metabolic disorders are also linked to the damage to two main tissues: skeletal muscle and vascular endothelium. Therefore, we have chosen these tissues as a model study of metabolic (and mitochondrial) dysfunction.

In the next segment of the research we deal with the mechanisms through which the deviations in nutritional quantity and quality, characteristic e.g. for obesity, provoke adipose tissue dysfunction. We also pay attention to mechanisms through which acquired dysfunction of fat tissue influences the function and the cellular composition of the fat tissue itself and the function of other peripheral organs involved in the regulation of the energetic metabolism, especially skeletal muscle and the pancreas (beta cells).

At the level of beta cells the programme focuses on explaining the molecular mechanism of apoptosis induction by saturated fatty acids on pancreatic beta cells and the molecular mechanisms by which unsaturated fatty acids inhibit the induction of apoptosis by saturated fatty acids.

In MODY diabetes and type 2 diabetes we observe the mechanisms of beta-cell damage and decline in insulin secretion. MODY diabetes is a relatively new type of diabetes, characterized by a clear autosomal-dominant inheritance. Currently 11 types of diabetes have been identified; the most common, however, are just 3 of these types: MODY 2 diabetes (MODY 2 diabetes glucokinase type with defect of glucokinase), MODY 1 diabetes (with defect of HNF4a transcription factor) and MODY 3 diabetes (with defect of HNF1a transcription factor). As we recently discovered, a relatively high percentage of MODY diabetes patients have specific antibodies GADA or IA2, which may indicate the destruction of beta cells in the islets of those who are sick by mechanisms which still remain unknown. Therefore we study the mechanisms which cause the reduction of insulin secretion and the eventual destruction of the beta cells in patients with MODY diabetes. Concurrently with this problem, we are studying in detail the mechanisms of insulin secretion and its loss in the classic type 2 diabetes. We focus mainly on the influence of nutrients and drugs on the secretion of insulin.

In the area of the influence of cell damage by higher levels of iron, the programme is focused on the transport mechanisms of iron in the cells of tissues which are critical for the metabolism of iron (enterocytes, hepatocytes), including the molecular mechanisms regulating the transport of iron, and on the explanation of molecular mechanisms of iron accumulation in the cells of tissues that are critical in terms of damage. In addition, we are studying molecular mechanisms of cell damage of these tissues as a result of the accumulation of iron, including the induction of apoptosis.

Due to the extensive nature of the programme we cannot describe in detail all of the topics dealt with. However, we must at least mention a study of inflammation and proinflammatory factors in the initiation and progress of atherosclerosis, issues of obesity, diabetes and endocrinology in childhood, a description of the nutritional status of fragile population groups or the burden of selected toxic substances in the population (e.g. brominated flame retardants). Particular success (including publication outputs) has been achieved by a working group dealing with the development of new electrophoretic methods for metabolic research.

**P32 - Disorders of Reproductive Health and a Healthy Start in Life**

The proposed programme is divided into three areas related to disorders of reproductive health.

- **Pathology of the female reproductive organs.** Prevention, early diagnosis and subsequent treatment are essential for effective reduction of various forms of disorders of the female reproductive organs. Aim: screening of selected pathological diseases of the reproductive organs, standardization of diagnostic and therapeutic procedures, early diagnosis and treatment.

The selected pathological conditions include:
- deep pelvic endometriosis
- changes in the uterine wall following caesarean section
- trauma to the muscular components of the pelvic floor and anal sphincter following vaginal delivery

- **Disorders of early foetal development.** Congenital defects are the most common cause of perinatal, neonatal and infant mortality and morbidity, nevertheless, the size of their contribution is not reliably known. Successful prenatal diagnosis leads to a reduction in the incidence of certain severe birth defects in infants (i.e. anencephaly, spina bifida, abdominal wall defects, Down syndrome), but for other types of developmental defects there is only a minimal decrease in incidence. However, there is also a group of congenital defects with minimal success of early detection.
Some complications associated with multiple pregnancies are currently not comprehensively managed at all in the Czech Republic. In the Czech Republic, there is currently no generally accepted programme for the primary prevention of congenital developmental defects. Highly specialized care is not concentrated and uniformly addressed.

Aim: Improving the effectiveness of prenatal diagnosis, developing a system for the implementation of screening in the Czech Republic, differentiation of congenital defects to those compatible and those incompatible with life, developing a system of long-term monitoring of children born with congenital anomalies. The aim of the programme is to optimize care for severe foetal complications and to concentrate prenatal complications that require a multidisciplinary approach and highly specialized diagnostic and therapeutic methods. Ultimately, the programme aims at reducing the mortality and morbidity of children with congenital defects.

- Foetoplacental pathology. Disorders in the development and function of the placenta have a fundamental influence on stillbirth, neonatal morbidity and mortality. This is a heterogeneous group of disorders. In most cases there is a development of clinical signs of disease in the mother or the foetus with minimal treatment options. There are also new data pointing to negative psychomotor development and increased cardiovascular risk in children with an impaired placental function during their intrauterine development.

Aim: early identification of high risk groups of pregnant women (optimally in the first trimester), early prevention of the development of clinical symptoms, determination of diagnostic procedures for foetuses with early and late foetoplacental dysfunction, monitoring postnatal development of children with impaired placental function.


The PRVOUK research programme "Morphology, Biomechanics, Diagnostics and Management of Complex Injuries and Functional Disorders of the Spine, Pelvis, Extremities and Syntopic Adjacent Organs and Structures" represents a systematic multidisciplinary approach to pathological conditions manifested in structural and subsequent functional disorders, caused either by external noxa or by disturbances in the course of development and growth. The general theme of the programme focuses on research of healing processes of tissues damaged by insult of various origin (especially mechanical, thermal, electrical etc.), including all accompanying phenomena. This theme requires the involvement of a wide range of disciplines in the research in order to bring a comprehensive approach. The key disciplines providing the theoretical basis for this field of research are anatomy and biomechanics, with some extensions and overlaps into pathophysiology and other disciplines. The research programme will address the following issues.

- Complex care for polytrauma patients
- Treatment of congenital defects, degenerative and inflammatory diseases and injuries of the spine
- Treatment of injuries of the pelvis and acetabulum, including complications and permanent consequences
- Multidisciplinary care for consequences of pelvic floor injury
- Mesenchymal locomotor tissue and supporting tissue substitutes (articular cartilage, bone)
- Complex care for geriatric patients with fractures in osteoporotic sites of extremity replantation
- Research and treatment of traumatic functional spinal cord disorders
- Use of muscle flaps in treatment of defects and infected injuries of the extremities
- Reconstructive plexus and peripheral nerve surgery
- Complex care for burn trauma

The PRVOUK programme "Morphology, Biomechanics, Diagnostics and Management of Complex Injuries and Functional Disorders of the Spine, Pelvis, Extremities and Syntopic Adjacent Organs and Structures" is thus a broadly conceived and open programme for the research of pathological conditions concerning the locomotor apparatus and closely related structures. It will be based on clinical research drawing on existing work done at the Centre for Integrated Study of the Pelvis (CISP), which has achieved excellent productivity and a high standard of outcomes. New directions in research will involve extending the problem to include other areas of the locomotor apparatus, the axial skeleton (including the spine) and the extremities. Recent high-tech procedures will be employed in the programme, e.g. transplantation of cultivated mesenchymal cells in the form of chondrocytes or osteocytes, study of the potential and the increase of effectiveness of bone healing, progress in burn treatment for new trauma, replantation of amputated extremities and others.

Human resources will be the responsibility of the programme council, whose members – playing a coordinating role – will be engaged in the programme throughout its entire duration. The programme will also be open to other staff from cooperating faculties as well as to researchers from other institutions offering clear potential for internationally applicable publications.

P34 - Psychoneuropharmacological Research
Both basic and clinical research is conducted mostly at the 3rd Faculty of Medicine, in collaboration with the 1st Faculty of Medicine.

Both basic and clinical research to design therapies is focused primarily on chronic pain, new combinations of drugs for the treatment of pain, addictology, hypoxia, the non-invasive and invasive treatment of spasticity (pumping systems, neurosurgery), as well as methods of neuromodulation (spinal cord stimulation, stimulation of the motor cortex, stimulation of the occipital nerve for migraine treatment, peripheral nerve stimulation). In the field of non-invasive neuromodulation techniques the research will study the possibility of using repetitive transcranial magnetic stimulation (rTMS) to treat chronic facial pain, depression, hallucinations and schizophrenia. The research also addresses the pathophysiology and therapy of severe neuropsychiatric disorders such as Alzheimer's disease, schizophrenia and depression. The studies are complemented with epidemiological data.

We will collaborate with the 1st Faculty of Medicine as follows:

- Department of Physiology - possibility of influencing hypoxic conditions by different transmitter systems (nicotine, melatonin).
- Department of Anesthesiology and Intensive Care (Pain Medicine Centre), Department of Neurosurgery - study of invasive neuromodulation techniques (stimulation of the cerebral motor cortex and occipital nerve stimulation in the treatment of headaches, especially migraine); study of the applications of electrophysiological methods in the investigation and treatment of pain (rTMS, neuromodulation, radiofrequency).

P35 - Cardiovascular Research Programme

The research programme "Invasive approaches to rescue or recovery of myocardium" (MSM0021620817, implemented 2005-11) has stimulated highly successful collaboration between Charles University's medical schools (the 4th Faculty of Medicine and the 3rd Faculty of Medicine) which has led to a large number of publications in various international journals, including highly prestigious journals with a very high impact factor. Staff from the two faculties have agreed not only to continue this collaboration, but to further develop and intensify it. The Cardiovascular Research Programme at the 2nd Faculty of Medicine will represent a continuation of the work done as part of the research programme of the Faculty and the 1M0510 Research Centre.

The PRVOUK Cardiovascular Research Programme is therefore designed as a broad-based, open research programme addressing cardiovascular diseases in all contexts. The basis of the programme will continue to be clinical research, which has given rise to excellent international results in the previous period: research will focus on acute coronary syndromes, coronary flow and myocardial infarction, percutaneous coronary intervention, cardiac arrhythmias, heart failure, valvular diseases, myocardial diseases, cardiogenic shock, minimally invasive cardiac surgery, cardiac anesthesiology, thrombosis and antithrombotic agents, advanced imaging methods (echocardiography, magnetic resonance imaging, computed tomography, etc.), and related areas.

The new directions of the research will bring a focus on infections of the cardiovascular system, non-pharmacological treatment of hypertension (renal denervation), the anatomy of vascular access and variants of the arterial and venous vascular bed, cardiovascular pharmacology, etc. The cardiovascular research at the 2nd Faculty of Medicine will be focused on the extension and validation of diagnostic approaches in invasive cardiology for adults and children. It will also be focused on evaluating the results of the therapy provided to children with complex heart defects and experimental studies of the pathophysiology of pulmonary hypertension.

The core research team will consist of the programme council, whose members will be engaged in the programme throughout its entire duration. The programme will be open to other staff from all three faculties, with the goal of supporting staff and projects offering clear potential for internationally applicable publications in prestigious journals. These co-workers and their cardiovascular research projects can be based on both clinical as well as preclinical and basic research fields.

P36 - Replacement, Support and Regeneration of Function of some Vital Tissues and Organs

Acute and chronic diseases requiring various types of replacement and support for the function of vital organs have significant implications in all fields of medicine, with a major impact on the outcome and cost of treatment. The programme is focused on various aspects of acute and chronic renal failure, multiorgan dysfunction, impaired liver function, as well as aspects of dysfunction of the vascular wall and its replacement. The main challenges include improvement of the biocompatibility of the materials used for dialysis treatment, optimization of therapeutic intervention for multiple organ dysfunction secondary to sepsis, definition of new molecular therapeutic targets, and optimization of viral infection prevention in transplant medicine. A specific research area involves the identification of selected pathological states in experimental models and their validation under clinical conditions. More specifically, researchers will seek to identify biomarkers that will enable the earlier, more accurate, and more reliable diagnosis of selected pathological conditions (acute and chronic renal injury, aortic aneurysms) and molecules causally related to the development and progression
of selected pathological conditions (multorgan failure in sepsis, uremic toxicity, inflammatory response to dialyzer incompatibility) in an effort to design a more effective and individualized therapeutic strategy. Regarding the regeneration and repair of vital organs, research has focused on the characterization of stem cells and their application in cellular therapy and organ regeneration (liver, kidney, central nervous system, blood vessels). Another goal of the programme involves research into the etiopathogenesis of failure of the above organs and alterations occurring in the body as a result of dysfunction of these organs. Measures are being tested which could be taken before the development of serious dysfunction of the respective organ, and which could delay the need for replacement or have a beneficial effect on the fate of patients who have reached a stage requiring replacement of function.

**P37 - New Procedures in Diagnostics and Therapy of Lifestyle Diseases and Diseases Connected with Population Ageing**

This PRVOUK programme is focused on current issues facing medicine in the Czech Republic and worldwide. The starting point of the programme is the interconnection between several factors: population ageing and associated health problems, the increasing number of people suffering from lifestyle diseases, and the necessity to make rational use of funding to meet the needs of health care for the general population. These factors create a need to carry out intensive, effective and comprehensive research in this area. In line with the above-mentioned factors, the programme focuses on three basic areas in which the Faculty of Medicine in Hradec Králové has had a long and successful tradition:

1. Research in the sphere of lifestyle diseases affecting the cardiovascular system is focused on problems of ischemic heart disease, sudden cardiac death and the specification of risks, as well as the non-pharmacological and pharmacological prevention of such events. Other spheres of research include the conditions for myocardium regeneration in experimental research and in clinical practice, and diseases affecting the gastrointestinal system.
2. Research in the sphere of oncology and haematology is focusing on predicting the impact and toxicity of treatment, the importance of individual dosage regulation of medicaments, predictions of the response to these medical procedures, as well as the probable impact of today’s diet and other lifestyle factors.
3. The problem of ageing and related health problems, including the study of regeneration on all levels. The research will focus on basic metabolic and molecular manifestations of ageing and on reparation and regeneration processes. An accompanying sphere of interest is the study of damage and reparation on the level of DNA, cells and organs, including possibilities to influence such processes.

The research work in these three interconnected spheres is carried out by 13 working groups.

**P38 - Biological Aspects of the Investigation of Human Movement**

The issue of human motoricity is investigated from the perspective of biomedical kinanthropology (including exercise physiology and kinesiology) and biomechanics. The objective of the programme is to monitor biomedical aspects of human movement including kinematic, structural and functional characteristics.

The research will cover three key areas:

1. Internal metabolic and biochemical processes which take place in the organism under conditions of physical load and/or hypo kinesis - exercise physiology;
2. Mechanical, structural and functional aspects – biomechanics;
3. The effects of physical load and motor activities on the human motor system in the context of phylogenesis and ontogenesis - kinesiology.

In more specific terms, research will focus on the following areas:

1. Genetic and metabolic predispositions for human performance, including skeletal muscle morphology, characteristics of body composition, and neuro-physiological mechanisms which play a key role in the control of movement during various regimens of muscle activity, including risk states and pathological states of the motor apparatus. Predominant approach: exercise physiology.
2. Structural response of tissues, organs and organ systems to the dynamic loading field, aiming to develop the mathematical expression of rheological parameters of thermo-visco-elastic tissue structures, including their shape and special characteristics. Predominant approach: biomechanics.

**P39 - Social Scientific Aspects of Human Movement Studies**

The programme includes the development of sub-branches of kinanthropology which research and analyze the influence of human movement on society. The programme will also investigate and clarify the complex, multi-faceted interrelations linking sport and other physical activities in current Czech society, including the impacts upon these social relations caused by the Czech Republic’s membership of the EU and current global trends in the development of sport. The
accentuation of complex social scientific approaches in kinanthropological research reflects the fact that the traditional mono-causal interpretation of the relations between the movement activities and their social benefits is inadequate to explain the complexity of these relations.

Research within the programme will apply a variety of different methods – from meta-analysis of projects implemented in the Czech Republic and abroad, to the monitoring and evaluation of movement regimes and their experimental verification and interpretation via a triangular approach involving both quantitative and qualitative data. The programme will also include the creation and standardization of new research methods, which will be constructed to allow comparison with the outcomes of previous Czech research projects and the results of current international research. We will also collaborate directly with research partners outside the Czech Republic.

**P40 - Drug Research**

The PRVOUK "Drug Research" programme constitutes a framework for the organization and institutional funding of research activities at the Faculty of Pharmacy. It involves all aspects of contemporary pharmaceutical sciences, employing a wide range of theoretical and experimental approaches to the study of new as well as established pharmaceuticals, predominantly small molecules of organic origin, with the capacity of ameliorating pathological processes in the human body.

Within the programme there are 24 specialist research groups dealing with virtually all aspects of pharmaceutical research. These involve:

- Syntheses of potential drugs and studies of their structure-activity relationships
- Pharmaceutical analysis of drugs and other biologically active substances
- Studies of medicinal plants and their therapeutically significant substances, assessments of their biological activities, toxicities and possibilities of biotechnological production
- Studies of the pharmacokinetic profiles of drugs with focus on interactions with transport and biotransformation proteins
- Use of polymers and special lipids for preparation of biodegradable, nanoparticle dosage forms and targeted biodistribution of drugs
- Analyses of factors determining the therapeutic value, consumption and necessity of drugs after their introduction to clinical practice

Detailed information can be found at the [Faculty of Pharmacy Science Portal](#).

**P41 - Biology**

The Biology programme encompasses the research goals of the biology departments of the Faculty of Science. The programme aims to foster high-quality research of living systems and support its international impact. The ambition is to integrate molecular, biochemical, structural, bioinformatic and ecological approaches in the study of the dynamics and plasticity of life, taking into account the whole spectrum of its organizational levels. It was the multidisciplinarity of approaches which contributed to the current increase in the Faculty’s research outputs and the growing international recognition of its research groups.

Cell and molecular biology research focuses on the roles and evolutionary origin of cellular organelles, such as mitochondria, on cell-to-cell communication both in single-cell organisms and in multicellular development, on the mechanisms that viruses or cellular pathogens use to engage their hosts, and on the mechanisms governing cell pluripotency and differentiation. Integrative approaches characterize the study of host-parasite interactions, animal communication, or animal and human behaviour. Several groups are part of broad international endeavours in genome research and in disease targeting projects. An important part of the programme is the research of processes and factors which affect biological diversity at all scales, starting from the genetic diversity of populations, including studies on the origin of species and interspecies hybridization, up to the evolution of diversity on the global level. Seminal discoveries have been made in the area of biodiversity changes which are brought about by biological invasions, climatic changes and anthropogenic factors.

The programme also serves as a framework supporting technology transfer initiatives, sharing know-how in the application of molecular techniques and data processing, and for coordinating the use of research instrumentation.

**P42 - Chemistry**

The programme encompasses the long-term research goals of the chemistry departments at the Faculty of Science. It focuses on the design, synthesis and characterization of new molecular and supramolecular systems usable in various applications.

Research within the framework of this programme aims to develop: (i) highly selective catalysts for important synthetic reactions; (ii) sensitive analytical methods for the characterization of complex mixtures of biomolecules and other biologically active compounds; (iii) supramolecular and polymer materials for applications in optoelectronics, photovoltaics and non-linear optics; (iv) compounds for medical imaging and radiodiagnosis; and (v) tumour suppressor
and immunomodulatory compounds. An integral part of the programme is the study of the physico-chemical properties of prepared systems using methods of molecular spectroscopy, mass spectrometry, and electrochemistry, diffraction, thermodynamic and hydrodynamic techniques, and methods of theoretical and computational chemistry.

The programme unites a range of experts from the Faculty of Science chemistry departments whose expertise covers all key chemistry disciplines. The interaction of these experts facilitates the efficient interconnection of different methodological approaches, the efficient design of new compounds and methods, and a significant contribution to our understanding of prepared systems. The programme also involves systematic collaboration with institutes at the Academy of Sciences of the Czech Republic and with institutions abroad. Students of all chemistry degree programmes, especially of post-graduate (PhD) and Master's degree programmes accredited at the Faculty of Science, are actively involved in this research.

**P44 - Geology**

The programme reflects long-term research priorities at institutes and in laboratories in the geology section of the Faculty of Science. Drawing on the results of previous large-scale research projects and reflecting current trends in geosciences, the programme is focused on investigating mechanisms and processes in the lithosphere and the metabolism of substances in the upper spheres of the planet Earth. The geology section of the Faculty is the only higher education institution (HEI) in the Czech Republic which covers the full range of geoscience disciplines from basic geology to theoretical and applied specialization. The programme will focus on key areas in which researchers from the geology section are actively publishing and achieving excellence at the international level: geological and applied research in several fields, e.g. flood risks, landslides, landscapes and land use/cover changes, international migration, urban and regional changes, population studies, or remote sensing and modelling of landscape changes.

The individual research activities will be carried out mainly in the areas of the Bohemian Massif and the Carpathians, which represent ideal natural laboratories for studying processes in the lithosphere. Because of our research collaboration with renowned laboratories abroad, numerous research projects will also be implemented in other regions, such as North America (California, Utah), Australia, Central America (Nicaragua), Africa (Zambia, Namibia) and Asia (Iran, Afghanistan, Siberia).

Undergraduate and PhD students will participate in the research activities alongside with the researchers and staff of the geology section. The programme will enhance the interaction between individual researchers and will lead to the

**P43 - Geography**

Charles University is an internationally recognized institution in geographical research, representing all sub-fields of the discipline: physical geography, human geography, demography and geoinformatics. Research in these areas builds on long-term teaching and research traditions and established research teams organized around recognized scientists. Geographical research at Charles University is focused on the dynamic changes of natural and social systems and on the risks and hazards which are related to these changes. The University pursues internationally recognized basic and applied research in several fields, e.g. flood risks, landslides, landscapes and land use/cover changes, international migration, urban and regional changes, population studies, or remote sensing and modelling of landscape changes.

The Geography programme is built around several key priorities which go beyond the scope of individual projects operating on a national or international level:

- **Development of geographical concepts and methodological approaches** is necessary in order to facilitate the deeper integration of particular research areas across geographical disciplines and to promote active involvement in interdisciplinary and trans-disciplinary research. The focus on interdisciplinary approaches in research is of vital importance, as geography will play an active role in the new Charles University Centre for the Study of Global Change.

- **Development of up-to-date research infrastructure** in several areas is of key importance for securing access to advanced research techniques, both for researchers and students. The programme supports the construction and upgrading of infrastructure for experimental field surveys and dynamic process monitoring (e.g. rainfall runoff processes or landslides), laboratories for advanced analyses (e.g. in geomorphology, dendrochronology), precise field survey techniques (e.g. UAV photogrammetry or mobile geodetic measurements) or tools for advanced geoinformatic analyses, ranging e.g. from remote sensing and spatial databases to historical maps.

- **Internationalization of research** is a tool for stimulating research progress and ensuring the wider international relevance of research. Besides participation in international research schemes, the programme also emphasizes support for focused joint research projects and involvement in international research networks and the global academic community. The aim is to enable and stimulate the cooperation of Charles University teams with international partners to address promising or emerging directions of research beyond the limits of existing formal schemes of cooperation.

These priorities are supported by a focused human resources policy which is based on transparent and motivational funding, reflecting the quality of results achieved by research groups and individual researchers, opening up positions for post-docs and young researchers and promoting the involvement of PhD students in the research teams.
formation of interdisciplinary research groups, which will become the key structures of the Centre for the Study of Global Change.

**P45 - Physics**

The programme encompasses the entire range of current research activities pursued by the School of Physics at the Faculty of Mathematics and Physics. In accordance with the Faculty’s long-term plan, the programme is focused on four principal research areas:

- **Condensed matter physics – new materials and technologies.** Research efforts in this area are concentrated on the complex study of the inter-relations of real electronic, atomic, and magnetic structures with bulk and surface physical properties of macroscopic and mesoscopic (nanostructured) systems. Key areas of recent focus are spintronics, quantum criticality and unconventional superconductivity coexisting with magnetism. An integral part of the research is the development and utilization of state-of-the-art methods of preparation and characterization of high-quality materials with tailored physical properties. Researchers at the Faculty operate two large research facilities: the Czech Materials Science Beamline at the ELETTRA Synchrotron in Trieste and the Magnetism and Low Temperature Laboratories (http://mtl.it) in Prague, which offers open access to its instruments.

- **Physics of molecular, macromolecular and biological systems.** The main activities in this area are focused on systematic basic research of physical processes in molecular, macromolecular and biological systems including natural and modified oligonucleotides, proteins, natural and artificial photosynthetic systems, photosensitizers for photodynamic therapy, membranes and other cellular parts, synthetic supramolecular structures, linear and cross-linked polymers, polymeric nanocomposites and gels. The research strategy is based on synergies created by the global application of advanced spectroscopic, microspectroscopic and imaging techniques combined with realistic ab initio quantum mechanics calculations, molecular dynamics simulations and statistical approaches.

- **Investigation of properties of nuclei and subnuclear particles and their interactions.** Research in this area involves both experimental and theoretical studies of the specific properties of atomic nuclei and subnuclear particles and their interactions. The main goals are to contribute to the final tests of the standard model (SM), to participate in possible discoveries of phenomena beyond the SM, and to improve current knowledge of the inner structure of atomic nuclei and interactions of nucleons. We are involved in several large international collaborations such as CERN, FNAL and KEK as well as neutrino and astroparticle experiments.

- **Physical study of objects and processes in the solar system and in astrophysics.** This area of research involves the synthetic investigation of objects and processes in the solar system and in the universe by methods of theoretical and experimental physics, using modern mathematical approaches, computer modelling, and recent technologies. Our goal is to understand the structure and dynamics of matter, fields and energy transfer in cosmology, astrophysics, solar-system physics, geophysics, and meteorology.

There is a rich tradition of productive and continuously developing international cooperation involving researchers and research teams at the Faculty. In addition to sophisticated experiments carried out at the Faculty’s laboratories, we can also exploit the unique opportunities offered by large experimental infrastructures (CERN, ILL, ESRF, ELLETRA, HZB, ISIS, etc.).

**P46 - Informatics**

The core of the programme lies in basic research in various directions leading to practical applications. The programme covers all major areas of informatics (computer science) in which our team can build upon previous, in many cases very successful, research: theoretical computer science with its foundation in discrete mathematics, mathematical logic, computational geometry, theory of formal and natural languages, computer graphics, software and distributed systems, database systems, and artificial intelligence.

In all areas with application potential, a major part of our research output will be formed by software products. In predominantly theoretical areas, the output will be in the form of publications in journals and conference proceedings. Besides the research work, we also plan to continue organizing international conferences, seminars, and workshops, as well as participating in programme committees at international conferences organized elsewhere. Our team members will also continue their editorial work for international journals and edit special issues of these journals published by well-known international publishers. International cooperation and participation of young researchers are very typical features of modern informatics, and so they will naturally form a major part of this programme.

**P47 - Mathematics**

The Czech mathematical school is widely respected, not only within the Czech Republic but also in the international community. This programme involves mathematicians working at the School of Mathematics of the Charles University Faculty of Mathematics and Physics, whose research achievements are comparable with those obtained by internationally renowned specialists in many fields of modern mathematics. In some branches of research, Czech mathematicians are considered to be leaders in their particular field.

The PRVOUK programme covers the following branches and fields of mathematics: **mathematical analysis** (in particular real and complex analysis, functional analysis, theory of both ordinary and partial differential equations), **mathematical stochastics** (probability and mathematical statistics, econometry, financial and insurance mathematics), **mathematical...**
modelling and numerical mathematics (mathematical modelling and analysis of partial differential equations, numerical computations and numerical analysis), structural mathematics (algebra, geometry, and mathematical logic), mathematical methods of security (“cryptology”), and history of mathematics.

There are non-trivial overlaps among the disciplines outlined above – for example the theory of partial differential equations or the theory of integrations lies in the sphere of interest of both mathematical analysis and mathematical modelling. Also, the stochastic versions of these are studied by mathematical stochastics. The same holds for some branches of functional analysis. We can also see fields of common interest for structural mathematics and mathematical analysis (e.g. differential geometry). Clearly mathematical logic and the history of mathematics are of interest to any mathematical discipline.

**P48 - Improvement of Modern Surgical Methods and Immunotherapy in Patients with Solid Tumours**

Departments of the 2nd Faculty of Medicine in Prague are involved in systematic research focusing on the treatment of solid tumours. Several grant-funded research projects on this topic have been successfully completed in previous years.

A unique area of research at the 2nd Faculty of Medicine is represented by the project focusing on active cell immunotherapy of solid tumours using dendritic cells. This project was launched by the Institute of Immunotherapy, with subsequent clinical projects organized in cooperation with surgical departments (surgery, gynecology, urology). Individual projects focus on the combination of standard treatment options, including surgery, with active cell immunotherapy.

The value of the PRVOUK programme is underlined by the fact that solid tumours of the intestinal, genital and urinary tracts represent the most frequent malignancies both in males and females. The crucial step in their treatment is correctly indicated and performed surgical therapy. Modern trends in surgery aim to achieve reduced invasivity while maintaining oncological efficacy. Research also focuses on the combination of surgery with systemic treatment modalities. Our hypothesis expects the efficacy of surgical treatment to be improved by the application of systemic active cell immunotherapy before and after surgery.

The goal of the programme is:
- Incorporation of active cell immunotherapy into the treatment algorithm of solid intestinal, gynecological and urological tumours
- Evaluation of the efficacy of less invasive surgical methods applied to these tumours – the criteria will be reduced patient morbidity and maintained or improved oncological efficacy

The PRVOUK programme provides the opportunity to continue research already carried out as part of previous projects and to bring new information about the treatment of solid tumours.

**P49 - The Genetic Basis of Serious Pediatric Conditions**

The functional network of clinical and research teams at the institutes and departments of the 2nd Faculty of Medicine enables us to carry out conceptual patient-oriented applied research that offers the potential substantially to increase knowledge in biomedical sciences. Within this context, our research focuses on the genetic basis of serious pediatric conditions.

On the clinical level (concerning patients and their clinical data), we collaborate with the pediatric departments at all other faculties of medicine within the Czech Republic. The participating institutes and departments of the 2nd Faculty of Medicine include the Department of Pediatrics, the Institute of Biology and Clinical Genetics, the Department of Pediatric Surgery, the Department of Orthopedics of Children and Adults, the Department of Pediatric Otorhinolaryngology, the neonatal section of the Department of Gynaecology and Obstetrics, the Department of Imaging Techniques, the Institute of Clinical Biochemistry, the Institute of Histology and Embryology, the Institute of Microbiology, and some additional working groups of the Faculty. The research projects are primarily focused on monogenic conditions with clinical manifestation either prenatally, soon after the birth, or later during childhood and adolescence. Establishing the genetic background contributes substantially to the individual diagnosis and outcome of the disease, enables presymptomatic diagnosis and/or genetic prevention among relatives, and in addition contributes to the general understanding of etiology, etiopathogenetic mechanisms and the genotype-phenotype link.

The basic areas of interest include hereditary nephropathies, defects of ciliary function, research of statural growth, beta-cell function and glycaemic regulation, development of hepatic and biliary functions and inflammatory bowel diseases, studies on the genetics of autism and mental retardation, pharmagenetics of hyperkinetic syndrome, clinical and molecular characteristics of RASopathies, research in patients with undefined marker chromosome, studies in children with impaired hearing including Pendred syndrome, determination of cleft lip and palate, research on novel biomarkers and their ontogenetic development, genetic determinants of inborn defects of the gastrointestinal tract,
Hirschsprung’s disease, anorectal atresia and diaphragmatic hernia, research on fasciculus arcuatus tracts in dyslectic children, research of hip joint dysplasia, pedes equinovari and additional limb defects, research of neurogenic defects of locomotion and genetic predisposition to arthrotic changes and local cartilaginous defects as well as somatic and neuropsychological development in children at developmental risk. Besides investigating human genetics with specific impacts on monogenic conditions, the research is also partially focused on microbial genetics and molecular epidemiology of pathogenic microorganisms in relation to human monogenic conditions (e.g. cystic fibrosis or type 1 diabetes).

The selection of topics is clearly focused on the potential for individual benefit to affected pediatric patients and individual treatment decisions. However, the results will also extend current biomedical knowledge in general terms.