GUIDE FOR ERASMUS STUDENTS AT THE BULGARIAN ACADEMY OF SCIENCES

ERASMUS CODE: BG SOFIA30

Sofia 2016

CONTENT

Part I
History of Bulgaria
Interesting facts you may not know about Bulgaria
UNESCO World Heritage sites
Bulgarian official holidays
Sofia airport
International bus stations in Sofia
Sofia central railway station
Phone calls in Sofia
Emergency phone numbers in Sofia
Sofia WiFi zones
Currency
What to try in restaurants (national cuisine)
Supermarkets
Cost of living
Electric current
Transport in Sofia
Public transport ticket prices
Metro
Shuttle buses (fixed route taxis)
Healthcare for foreign citizens in Sofia
Hospitals in Sofia
Pharmacies in Sofia

Part II
Bulgarian Academy of Sciences
Erasmus office
Tuition taxes
Language of instruction
Application procedure
After arrival
Grading system
Accommodation

Part III
Campuses of BAS
Units of BAS (corresponding to faculties in universities):

LIST OF RESEARCH UNITS

INFORMATION AND COMMUNICATION SCIENCES AND TECHNOLOGIES

Institute of Mathematics and Informatics (IMI)
Institute of Information and Communication Technologies (IICT)
Institute of Mechanics (IMech)
Institute of System Engineering and Robotics (ISER)
National Laboratory of Computer Virology (NLCV)
Laboratory of Telematics (LT)

ENERGY RESOURCES AND ENERGY EFFICIENCY

Institute of Nuclear Research and Nuclear Energy (INRNE)
Institute of Electrochemistry and Energy Systems (IEES)
Institute of Chemical Engineering (IChE)
Central Laboratory of Solar Energy and New Energy Sources (CLSENES)

NANOSCIENCES, NEW MATERIALS AND TECHNOLOGIES

Institute of Solid State Physics „Acad. Georgi Nadjakov“ (ISSP)
Institute of Electronics „Acad. Emil Djakov“ (IE)
Institute of Optical Materials and Technologies „Acad. Jordan Malinovski“ (IOMT)
Institute of Mineralogy and Crystallography „Acad. Ivan Kostov“ (IMC)
„Acad. A. Balevski“ Institute of Metal Science, Equipment and Technologies with Centre for Hydro- and Aerodynamics (IMSET-CHA)
Institute of General and Inorganic Chemistry (IGIC)
Institute of Organic Chemistry with Centre of Phytochemistry (IOCCP)
Institute of Physical Chemistry „Acad. Rostislaw Kaischew“ (IPC)
Institute of Polymers (IP)
Institute of Catalysis (IC)
Central Laboratory of Applied Physics-Plovdiv (CLAP)

BIOMEDICINE AND QUALITY OF LIFE

Institute of Molecular Biology „Acad. Roumen Tsanev“ (IMB)
Institute of Neurobiology (INB)
Institute of Microbiology „Stephan Angeloff“ (IMicB)
Institute of Biophysics and Biomedical Engineering (IBPhBME)
Institute of Biology and Immunology of Reproduction „Acad. K. Bratanov“ (IBIR)
Institute of Experimental Morphology, Pathology and Anthropology with Museum (IEMPAM)

BIODIVERSITY, BIORESOURCES AND ECOLOGY

Institute of Biodiversity and Ecosystem Research (IBER)
Institute of Forestry (IF)
Institute of Plant Physiology and Genetics (IPPG)
National Museum of Natural History (NMNH)

CLIMATE CHANGES, RISKS AND NATURAL RESOURCES

Geological Institute „Acad. Strashimir Dimitrov” (GI)
National Institute of Geophysics, Geodesy, and Geography (NIGGG)
National Institute of Meteorology and Hydrology (NIMH)
Institute of Oceanology „Prof. Fridtjof Nansen“ (IO)

ASTRONOMY, SPACE RESEARCH AND TECHNOLOGIES

Institute of Astronomy with National Astronomical Observatory (IA NAO)
Space and Solar-Terrestrial Research Institute (SSTRI)

CULTURAL-HISTORICAL HERITAGE AND NATIONAL IDENTITY

Institute for Bulgarian Language „Prof. Lyubomir Andreychin“ (IBL)
Institute for Literature (IL)
Institute for Balkan Studies with Centre of Thracology „Prof. Alexandar Fol“ (IBSCT)
Institute of Ethnology and Folklore Studies with Ethnographic Museum (IEFSEM)
Institute for Historical Studies (IHistS)
Institute of Art Studies (IAS)
National Archaeological Institute with Museum (NAIM)
Cyrillo-Methodian Research Centre (CMRC)

MAN AND SOCIETY

Institute for Economic Studies (IES)
Institute for the State and Law (ISL)
Institute for Population and Human Studies (IPHS)
Institute for the Study of Societies and Knowledge (ISSK)

Part I

HISTORY OF BULGARIA

The geographical position of Bulgaria, on the crossroads between Europe and Asia and North and South, is reflected in the rich and ancient history of Bulgarian culture, architecture, cuisine, customs and clothes.

The first Bulgarian Kingdom was founded by Khan Asparouh in 681. It was inhabited by Slavs and Bulgarians who had come from an ancient Bulgarian state situated on the Volga river. The creation of the Slavonic alphabet by brothers Cyril and Methodius in 863 and the establishment of Christianity (East Orthodox) as a state religion in 864 contributed to the development of the Bulgarian nationality and created conditions for the flourishing of Bulgarian literature and culture. From 1018 till 1185 Bulgaria remained in the Byzantium Empire. In 1185 the Second Bulgarian Kingdom was declared after the end of Byzantium rule and oppression. In 1393 after a long war and fierce resistance the country fell under Turkish rule.

After an unsuccessful revolution in 1876, Bulgaria received freedom thanks to the Russian-Turkish Liberation War (1877-1878). The state was separated into three parts after the Berlin Conference in 1878.

In 1989, the country performed an unprecedented peaceful transition from autocratic communist rule to a democratic system. A new Parliament was elected in June, 1990 after the first free elections in 50 years. This Parliament made a New Constitution said to be one of the most democratic constitutions in Europe and the first among the former socialist countries. The main tasks facing the New Parliament (elected in the second free elections, October 1991) are creating laws that will ensure a transition to a free market economy.

Valuable cultural monuments have remained from Ancient Thrace on the territory of present-day Bulgaria which inspire the imagination and make us admire their beauty such as tombs (such as the Kazanlak tomb, the Aleksandrovska tomb, and the Sveshtarska tomb); treasures (the Panagyursko, Rogozensko, and Valchitransko teasures, among others); and sanctuaries and temples (at Perperikon, Starosel, Kozi Gramadi, Begliktash, and elsewhere).

In the middle of the 1st century AD, all Bulgarian lands became a part of the Roman Empire. Many architectural and archaeological monuments have been preserved from this period, such as the Ancient Theater and the Roman Stadium in Plovdiv, and remains of the Roman cities Ulpia Escus, Nove, Nikopolis ad Istrum, Nikopolis ad Nestum, Augusta Trayana, and Abritus.

After the dissolution of the Roman Empire, the present Bulgarian lands came under the control of the East Roman Empire, later called Byzantium by historians. In the second half of the 7th century, the proto-Bulgarians settled in what is now Northeast Bulgaria. They united with the Slavs to form the Bulgarian state, recognized by Byzantium in 681. The head of the state was the leader of proto-Bulgarians Han Asparouh, and the city of Pliska was declared the state's capital.

uring the reign of Han Krum (803-814), Bulgaria bordered the empire of Karl the Great to the west, and the Bulgarian armies reached the gates of the Byzantium capital, Constantinople to the east. In 864, during the reign of Prince Boris I (852-889), Bulgarians adopted Christianity as their official religion, which makes Bulgaria one of the oldest Christian states in Europe.

At the end of the 9th century, the brothers Cyril and Methodius created and disseminated the Slavonic alphabet. Ohrid and Veliki Preslav became centers of the Bulgarian and Slavonic culture. From Bulgaria, the Slavonic alphabet spread to other Slavonic states as well. To the present day, Russia, Serbia, Ukraine, Macedonia and Belarus still use the Cyrillic alphabet, with rules of orthography established by the students of Cyril and Methodius and their followers in the Bulgarian capital Preslav. The reign of Tsar Simeon the First (893 – 927) is famous as the Golden Age of Bulgarian Culture, and the borders of the country at that time reached to the Black Sea, the Aegean Sea and the Adriatic Sea.

In 1018, after protracted warfare, Bulgaria was conquered by Byzantium. In 1186, an uprising led by the boyar brothers Asen and Peter freed Bulgaria from Byzantine rule, establishing the Second Bulgarian Kingdom, with Tarnovo as its capital.

The former might of Bulgaria was restored during the rule of their youngest brother Kaloyan (who ruled from 1197-1207), and during the reign of Tsar Ivan Asen the Second (1218-1241), the Second Bulgarian Kingdom reached its zenith, achieving political hegemony in Southeast Europe. It expanded its borders to the Black Sea, the Aegean Sea and the Adriatic Sea and greatly developed its economy and culture. Some of the most important monuments preserved from that time are the wall paintings in the Boyana church, the churches in Veliko Tarnovo, the Zemenski Monastery, the Ivanovski Rock Churches, the miniatures that illuminate the London Gospel, and the Manasiy Chronicle.

At the end of the 14th century, the country was conquered by the Ottoman Empire. In the first years of Ottoman rule there were scattered attempts to liberate the country. Later the Hayduk movement created the preconditions for an organized national liberation movement.

The Bulgarian Revival began at the beginning of the 18th century, when the Bulgarian church, educational and culture institutions were re-established. The beginning of the organized national liberation movement to throw off the Ottoman rule was marked by the activities of Georgi Rakovski (1821-1867), while key figures in the liberation movement were Vasil Levski (1837-1873), Lyuben Karavelov (1834-1879), Hristo Botev (1848-1876), among others.

In April 1876, the April Uprising took place. This was the largest and the best organized attempt to liberate Bulgaria from Ottoman domination. The uprising was brutally suppressed, but it placed the struggle for Bulgarian sovereignty at the center of international political discussions.

In 1878, with the Russian defeat of Turkey, the Bulgarian state was restored. The Berlin Congress (1878) divided the former Bulgarian territories into three parts – the Principality of Bulgaria, ruled by a prince; Eastern Rumelia, with a Christian governor appointed by the sultan, with Thrace and Macedonia remaining under Ottoman control. Alexander Battenberg was selected as the first prince of the Bulgarian Principality.

Bulgaria's first constitution was adopted in 1879, and was one of the most democratic constitutions of its time. In 1885, the Principality of Bulgaria and Eastern Rumelia united. In 1908, the Bulgarian Prince Ferdinand Sachsen-Coburg-und-Gotha proclaimed Bulgaria's independence from Turkey, and he was then declared Tsar of the Third Bulgarian Kingdom.

Bulgaria was victorious in the Balkan War of 1912, when together with Serbia and Greece the country gained the independence of Thrace and Macedonia. However, discord among the former allies led to the outbreak of the First Balkan War (1913), in which Bulgaria was defeated. As a result, territories predomi

Dnantly inhabited by Bulgarians were cut off from the state. The participation of Bulgaria in the First World War on the side of the so called Allied Powers ended in national catastrophe. The Neuilly Peace Treaty (1919) imposed strict sanctions on Bulgaria, and the country lost much of its territory. In the beginning of the 1940s, Bulgaria's foreign policy reflected the interests of Germany and the Axis powers. In 1941, Bulgaria entered the war on the side of the Axis, but the Bulgarian army did not participate in the battles on the Eastern Front. During this time, Tsar Boris the Third, representing the general consensus, refused to deport some 50,000 Bulgarian Jews. Of all European countries, only Denmark and Bulgaria managed to save their Jewish populations from the Nazi gas chambers. In the autumn of 1944, Bulgaria joined the Allied Forces and actively participated in expelling the German forces from Southern and Central Europe.

After the Second World War, Bulgaria came under the political and economic influence of the Soviet Union. In 1946, the country was declared a republic, and the Bulgarian Communist Party came to power. All political parties except for the so-called Fatherland Front (Otechestven Front) were forbidden, the economy and the banks were nationalized, and the agricultural land was organized as collectives.

The democratic changes in Bulgaria started at the end of 1989, when multi-party elections were held, and a new constitution was adopted. At this time Bulgaria began its transition to democratic development and a market economy. Its foreign policy was redirected towards rapprochement with European institutions. Since 1991, Bulgaria has been a member of the Council of Europe, and in 2004 Bulgaria became a member of NATO. In 1995, it filed an application to join the European Union, with negotiations commencing in 1999. On 25 April 2005, the Accession Treaty granting the Republic of Bulgaria the right to join the European Union was signed in Luxembourg. On 1 January 2007, after fulfilling all membership criteria, Bulgaria became a full-fledged member of the European Union.

INTERESTING FACTS YOU MAY NOT KNOW ABOUT BULGARIA

The oldest gold treasure in history was unearthed at the Varna Necropolis site in northeastern Bulgaria. The treasure dates back more than 6,000 years and consists of the most ancient handcrafted gold items in the world: more than 3000 golden objects were discovered in 294 graves. Amazingly, this collection of global importance is not among the 9 UNESCO World Heritage Sites in Bulgaria.

Bulgaria produces about 70% of the world supply of rose oil for the global perfume industry and is known as Land of Roses.

Local yogurt is unique owing to the bacterium Lactobacillus bulgaricus, discovered by Bulgarian microbiologist Stamen Grigorov in 1905. It is world famous for its health benefits.

Bulgaria is one of the biggest wine producers.

Bulgaria is the birthplace of Orpheus – the mythical musician and singer.

The Cyrillic alphabet, one of the world's most widely used writing systems, was invented at the Preslav Literary School in Bulgaria, under the guidance of Clement of Ohrid, as early as the 9th century. Today it is used in 12 countries in Europe and Asia by over 250 million people.

With the accession of Bulgaria to the EU on January 1, 2007, Cyrillic became the third official alphabet of the EU.

The Bulgarian Army is the only force in the world which has never lost a single flag in its history, although the country actively participated in all major wars in Europe since the end of the 19th century.

The Bulgarian Dan Kolov is the first wrestler in the world who won 1500 matches and lost only 2.

Christo Toprakchiev, a Bulgarian Air Force pilot in 1912, during the First Balkan War, first suggested the use of aircraft to drop „bombs" (called grenades in the Bulgarian army at this time) on Turkish positions.

The world's first digital wristwatch was developed by the Bulgarian Peter Petrov.

The inventor of the first electronic computer John Vincent Atanassoff is of Bulgarian origin. Professor John Atanassoff, together with graduate student Clifford Berry, built the world's first electronic digital computer at Iowa State University, between 1939 and 1942.

According to statistics, Bulgaria ranks third in Europe, only after Greece and Italy, in the number of archaeological sites of cultural importance on its territory.

The Bulgarian folk song "Izlel e Delyu Haydutin" by the Bulgarian folk music singer Valya Balkanska was sent in deep space on board of the US Space Probe Voyager I, part of a collection of our civilization's finest cultural artifacts, as a message to alien intelligence.

Martenitsa is a ritual decoration of white & red yarns with tassels worn from each March 1st until one sees a stork as a symbol of health, good luck and the coming spring.

In 1979, Bulgaria became the sixth country in the world to send an astronaut (cosmonaut) in space. Two Bulgarians were part of the Soviet Union's Intercosmos space program of manned orbital missions – Georgi Ivanov and Aleksandar Aleksandrov.

Professor Ivan Mitev Ivanov, a Bulgarian pediatrician and cardio rheumatologist, discovered the sixth heart tone, called the tone of Mitev.

Georgi Nadjakov discovered the photoelectret state of matter essential to modern photocopying.

Dimitar Paskov is a Bulgarian chemist who created the medicine Nivalin - against paralysis - in 1959. The original phytopreparation is an extract of the bulbs of common snowdrop.

Asen Yordanov constructed the first Bulgarian airplane and is one of the creators of the airbag.

Bulgaria has nine UNESCO World Heritage Sites:
Three monuments of medieval Bulgarian religious culture (the Boyana Church*, the Rila Monastery and the Rock-hew Churches of Ivanovo)

The early medieval large rock relief Madara Rider

Two natural sites: the Pirin National Park and the Srebarna Nature Reserve

The ancient city of Nessebur, on the coast of the Black Sea — a unique combination of European cultural interaction, as well as, historically, one of the most important centers of seaborne trade in the Black Sea

Two Thracian tombs

**Boyana is a district of Sofia, in the skirts of Vitosha mountain.*

National flag of Bulgaria

The 6th century church of St. Sofia which has given the city its name

BULGARIAN OFFICIAL HOLIDAYS

National Holidays in Bulgaria are not necessarily non-working days. Most stores are open all days of the year, even on New Years Day; it may be for fewer working hours.

1 January – New Year's Day
3 March – National Holiday /Bulgaria's Liberation from the Ottoman Empire/
1 May – Labour Day
6 May – Gergyovden (St. George's Day) and Bulgarian Army's Day
24 May - Bulgarian Education and Culture, and Slavic Script Day
6 September - Unification Day
22 September – Independence Day
1 November – Day of the Bulgarian Enlighteners (holiday for all educational institutions)
24 December - Christmas Eve
25, 26 December - Christmas Days
Easter Holidays– 4 days /Good Friday, Holy Saturday, Easter Sunday and Monday/ according to the Orthodox calendar of the year

SOFIA AIRPORT

Sofia Airport (SOF/LBSF) is the main airport of Bulgaria. It is located 5 km to the east from the centre of the city.

Terminal 1

This terminal was built in the first half of the 20th century and opened in 1937. It has been extended and improved many times, including a major renovation in 2000. Terminal 1 currently serves low-cost and charter carriers.

Terminal 2

Terminal 2 was officially opened on 27 December 2006 with the symbolic arrival of Bulgaria Air flight FB 408 from Brussels. It is located to the east of Terminal 1 and is significantly bigger than the old one.

At the eastern end of the Terminal, an end station for Line 1 of the Sofia Metro has been built under the name Sofia Airport Metro Station. The journey between airport and central Sofia takes about 20 minutes with service provided 05.30-24.00 hrs. The price of a single ride ticket is 1.00 lev (~0.50 EUR) (it is expected to become 1.50 lev in a few months). The ticket is valid for the entire Sofia Metro network, including the transfer to Line 2. Tickets can be purchased from the cashier desks in the metro station or from ticket machines.

A free shuttle is available from Terminal 1 to Terminal 2 and the Metro Station at every 30 minutes between 07:00 and 19:00 h. After 19:00 h the shuttle may be requested at the information desk.

Two bus routes (No 84 and 384) stop at the airport:

Line 84 goes to Sofia University and connects the airport with the city centre.

Line 384 connects the airport with the Tsarigradsko shose Metro Station.

A train station was built in 2015 which connects the airport with the national railway system of Bulgaria.

You can buy tickets for the public transport at Sofia Airport from the newspaper kiosks in the public areas of Terminal 1 and Terminal 2, or, alternatively, from the ticket machine in the public area of Terminal 1, Arrivals. The machine accepts Bulgarian banknotes and coins, and the tickets are valid for bus lines Nos 84 and 384.

Ticket machines for metro tickets are located at Sofia Airport Metro Station. The ticket machines accept Bulgarian banknotes and coins, and one of them accepts credit cards as well.

Important: Any piece of luggage exceeding 60x40x40 cm requires a separate ticket.

You can use also a taxi to go to the city. To avoid the unpleasant possibility to pay unjustified large taxi fare which happens to tourists at the airport, we recommend OK Supertrans taxi company. It has also a contract with the airport. You can request the service at the offices of OK Supertrans in the Arrivals of Terminal 1 and Terminal 2 or on: +359 2 973 2121, and the floor markings in yellow will lead you to the taxi stand area.

INTERNATIONAL BUS STATIONS IN SOFIA

1. Central Bus Station – 100, Maria Louisa Blvd.

http://www.centralnaavtogara.bg/

Sofia possesses a very well developed transport grid, reaching also more distant residential districts. Regular bus and tram lines stop right next to the Central Bus Station building.

Bus stops:

Central Railway Station Square - buses 60, 78, 85, 213, 214, 305, 313, 404, 413

Tram stops:

1. Central Railway Station Square - Trams 1, 3, 6, 7, 9
2. Kozloduy Street - Trams 1, 7

There is a permanent taxi stop in front the exit of the Bus Station. Many Fixed Route Taxis (shuttle buses) pass next to Central Bus Station Sofia, too.

2. Serdika Bus Station is situated between the Central Bus Station and Sofia Railway Station, Maria Louisa Blvd. It hosts both domestic as well as international lines.

SOFIA CENTRAL INTERNATIONAL RAILWAY STATION

Many lines of Sofia City Transport have stops next to it: bus lines 35, 60, 74, 77, 78, 82, 85, 101, 150, 213, 214, 305, 404 and 413, tram lines 1, 3, 4, 6, 12 and 18 and metro (second Metro Diameter).

Address: 102A, Knyaginya Maria Louisa Blvd..

Train timetable information: Tel. (02) 931 11 11, Cellular: 0884 139 481

PHONE CALLS IN SOFIA

The telephone code for Sofia is 02, and then follows the seven-digit number of the owner: 02-XXXXXXX;

From abroad, you must dial the code for Bulgaria 00359, then the code for Sofia without the zero and finally the number of the owner: 003592-XXXXXXX;

Mobile numbers in Bulgaria begin with 08 and consist of ten digits. No codes are necessary if you are calling from the country: 08-xxxxxxxx;

From abroad, you must first dial the code for Bulgaria 00359 and then the mobile number without the leading zero: 003598-xxxxxxxx.

There are three mobile (cell phone) operators in Sofia: MTel, Telenor, Vivacom.

EMERGENCY PHONE NUMBERS IN SOFIA

Single European emergency number – 112

Ambulance – 150

Fire Brigade – 160

Pirogov Hospital – 02/915 44 11

Hotline for victims of abuse – 02/981 76 86

KAT (Control of road transport) – Auto Accidents – 165, 02/982 49 01/02

Police Sofia – 166

Mountain Rescue – 02/963 20 00, 0887 100 237

Call 112 in the following cases:

- Need of emergency medical services
- Transport accidents
- Natural Disasters
- Fires or Acts of terrorism
- Disorderly conduct

SOFIA WIFI ZONES

1. Sofia Airport;
2. Central Intl. Bus Station;
3. All metro stations;
4. The entire pedestrian part of the "Vitosha" boulevard and "Slavejkov" square;
5. National Palace of Culture (pronounced "EnDeKa"), on the Bridge of Lovers;
6. "Zaimov" Park;
7. Doctor's Garden (next to the Sofia University "St. Kliment Ohridski");
8. Central Halls ("Tsentralni Hali") – department store for food and some other goods, Maria Louisa Sq.;
9. Holy Trinity Park ("Park Sveta Troitsa");
10. St. George's Park ("Park Sveti Georgi" next to "Pette Kiusheta", which means "Five Corners");
11. Park "Bukata" (at Madara Bath);
12. The entrance to the park Borisova Gradina;
13. National Science and Mathematics High School.

WiFi access is also available in other schools as well as in universities, and also in some taxi cabs. Almost every hotel offers free internet access, as do hundreds of restaurants and cafeterias. See: http://www.wificafespots.com/wifi/city/BG--Sofia

CURRENCY

The national currency in Bulgaria is called lev (Pl. – leva) or BGN. A hundred stotinki make 1 lev (100=sto).

The Bulgarian Lev is pegged to the Euro: 1 EUR = 1.9558 BGN

WHAT TO TRY IN RESTAURANTS

Traditional Bulgarian cuisine is varied and delicious. There are a lot of salads, bakery products and stews in it. Unlike other cuisines, products are usually cooked together.

Some characteristic products are the Bulgarian yogurt, white cheese and big pink sweet tomatoes known as "buffalo hearts".

One of the most famous and popular breakfasts in the country is a bakery product, called "banitsa", which may have various fillings – cheese, spinach, meat, etc. It is usually consumed with yoghurt or boza (see below). Other popular breakfasts are pancakes, fritters.

The country produces fruit and vegetables with exceptional taste, frequently organic. Therefore salads are a common appetizer, often accompanied by a glass of rakiya, the typical Bulgarian alcohol drink. The most popular Bulgarian salad is the shopska, but there are also others that deserve to be tasted – Shepherd's salad (ovcharska salata), Snezhanka, Harvester's salad (zhetvarska salata), roasted peppers and many more.

Common fresh or cooked ingredients are tomatoes, peppers, cucumbers, onions, cabbage, carrots, turnips, potatoes. Basic spices are salt, oil, vinegar, red and black pepper, parsley and dill. Olive oil is used more seldom. During the winter, pickled salads are a tradition. They are called "turshia". Kyopoolu, a paste of aubergines and red peppers as well as Lyutenitsa, a red pepper and tomato dip, are often served as salads, too. Meat appetizers include flat sausages of high quality such as "sudjuk", "loukanka", "pastarma" and "banski starets".

"Tarator" is a typical cold soup made of yogurt, cucumber, dill, chopped walnuts and spices. Another popular soup is the tripe soup ("shkembe chorba").

Some of the most popular main courses are different kinds of grilled meat: meatballs, sausages, kebabs, karnacheta etc. Various stews are prepared in clay pots (earthenware dishes) such as chomlek, kavarma, kapama and others. A favorite Bulgarian dish is the "Sarmi". They represent balls of meat or/and rice stuffing wrapped in grape leaves or cabbage leaves. Stuffed peppers with cheese and eggs or with minced meat and rice are also an excellent choice. The preparation of Cheverme, a whole lamb roasted on a spit, is an attraction. Potatoes are also consumed a lot. The most popular potato dishes are the ogreten, patatnik, potato stew, french fries etc.

Some traditional Bulgarian desserts are homemade biscuit cake, fruit compote, buffalo yogurt with honey and walnuts, the syrupy "tulumbi" and "baklava" and pumpkin pie.

Bulgarian wines are of excellent taste. Another popular alcoholic beverage in the country is the rakiya (a kind of brandy). It is made from grapes or other fruits – plum, apricot, figs, pears and more. A widely consumed alcoholic beverage is also the mastika, with a taste similar to the Greek "ouzo". The local beers are also numerous and quite tasty.

The ayryan or the boza are local soft or low-alcohol drinks, used also after a hangover. Ayryan is made of yogurt diluted with water, sometimes salted to taste. The boza is produced by fermentation of millet or wheat flour. It is sweetened with sugar or artificial sweeteners. Usually, it contains 0.5% alcohol.

SUPERMARKETS

You can also buy food products and prepare them on your own. There are big chain stores all over Sofia where the prices are generally lower. Here are some of them:

Lidl	Kaufland	Fantastico	Hit	T-Market	Verde
Billa	Carrefour	Piccadilly	Metro	Europe	345

What is typical for the shops and supermarkets in Sofia is that they have different working hours.

COST OF LIVING

(APPROXIMATE PRICES OF SOME FOOD PRODUCTS):

1 bread – 1 lev
1 l fresh milk – 1,30 lv
1 yoghurt – 0,90 lv
1 kg chicken – 6 lv
1 kg pork – 8 lv
1 kg cheese – 10 lv
1 kg yellow cheese – 14 lv
1 egg – 0,30 lv
1 kg potatoes – 0,70 lv
1 kg apples – 1,20 lv
1 kg tomatoes – 1,50 lv
1 beer – 1,20 lv
1 bottle of wine – 5 lv

Tap water in Sofia is drinkable.

ELECTRIC CURRENT

The voltage of the electric current in Bulgaria is 220-230 V, 2-pin plug.

TRANSPORT IN SOFIA

The automated fare collection

system is based on a contactless chip card (smartcard).

The card is issued once in a ticket kiosk of Sofia Urban Mobility Centre EAD (SUMC) (see Ticket Offices),

and then it must be reloaded. The smart cards loaded for a certain period are valid and can be used

in all transport vehicles while the smart cards loaded for a certain number of trips can only be used in trams

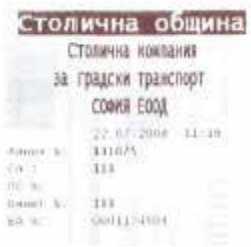
and trolleybuses.

In trams and trolleybuses, the fare is collected from the card at special devices, validators:

It is not validated in buses! If the card is loaded with trips, the fare cannot be collected in the buses and the underground!
During fare collection direct contact with the validator is not required. It is enough for the card to be at 1-2 cm or to touch the validator for 1-2 seconds without moving. If your card is valid, the validator's display will turn green: validation is successful! You will hear a sound and the arrow at the top of the validator will turn green.
If your card is invalid (the credited period has expired or the trips have finished), the display of the validator will turn red and show the reason why the validation was unsuccessful, a sound will be heard and the cross at top of the validator will turn red. If you have removed your card too fast for it to be read, UNSECCESSFUL VALIDATION will be displayed in red. By pressing the CARD CHECK button, you may check the remaining period or trips.

In trams and trolleybuses, passengers may purchase a single-trip ticket from an on-board ticket vending machine. The machine issues a ticket with predefined price, on which all details of the journey are printed: date, time, line No. and vehicle No. Ticket vending machines in trams and trolleybuses are situated near to the first door.

How to buy a ticket from the vending machine in the vehicle?



The vending machine accepts coins of 10, 20, 50 stotinki and BGN 1.60 and does not give change.
When you insert the amount required for a single ticket, the vending machine immediately issues a ticket.
The ticket must be pulled forward and downward.
Tickets issued from ticket vending machines should not be perforated.
You can also purchase a 10-trip voucher ticket from ticket-offices and ticket kiosks at the price of 8 BGN. After boarding the vehicle, the voucher with №1 has to be separated and perforated. For the next trip, you should tear-off and perforate the next voucher and so on.
Travelling with Sofia metro is allowed with ticket or pass. The tickets can be purchased from the metro ticket offices or from the ticket vending machines situated in the metrostations. The price of the ticket is 1 BGN. You can also buy an electronic card loaded with 10 trips for metro at the price of 8 BGN or a monthly pass for metro at the price of 35 BGN.

By ticket inspection, the fine for a passenger without a valid transportation document is 20 BGN. If the passenger refuses to pay the penalty ticket, he may have to pay 100 BGN instead.

IMPORTANT! If you are travelling with luggage with dimensions exceeding 60/40/40 you are obliged to buy and perforate another ticket. If you are travelling with a 10-trip voucher ticket, you should perforate a separate voucher from the ticket for your luggage.

METRO

Currently there are two metro lines in operation.
- Line 1 - 20.2 kilometers with 16 stations (one line). On working days it provides services to an average of 170,000 people.
- Line 2 - a second 6.4 kilometers line was opened in August 2012.
They intersect at Serdica station.
- Line 3 – under construction

The development plan of the metro lines envisages the following by 2018:

The first diameter " Obelya district – Lyulin district – Centre – Mladost district – Druzhba district – Sofia Airport"
will be 29 km long and will consist of 23 metro stations.

The second diameter "Lozenets district – Centre - Ilientsi quarter" will be 17 km long and will consist of 17 metro stations.

The third diameter "Knyazhevo district – Centre - Poduyane district - Levski district" will be 19 km long and will consist of 23 metro stations.

The diameters intersect into a triangle in the city, thus each section of the metro route could be reached within one single change of the line.

SHUTTLE BUSES (FIXED ROUTE TAXIS)

Shuttle buses or "marshroutki", as they are called in Bulgaria, are mini buses for about 10-15 travellers. There are no shuttle bus stations, so just raise your hand when you see it coming, and it will stop and pick you up. When you are already close to the place where you want to get off, tell the driver where you want him to stop. The ticket costs 1.50 leva. It should be paid directly to the driver when you get on. Information about shuttle bus routes in Sofia can be found here: http://marshrutki.com/

HEALTHCARE IN SOFIA

Medical help for citizens of the EU, Norway, Iceland and Liechtenstein within the scope of the public health insurance

In the Republic of Bulgaria, public health insurance is performed by one health insurance fund: The National Health Insurance Fund (NHIF). It is a public institution which provides mandatory health insurance in the country and has 28 subdivisions in the regional central cities – regional health insurance funds (RHIF).

In order to receive medical and dental care, you should only use health establishments for outpatient care, health establishments for hospital care and independent medical and diagnostic laboratories which have concluded an agreement with the National Health Insurance Fund.

Logo of NHIF
on the shop windows of pharmacies which have concluded an Agreement with it

You don't have to pay for health services provided within the package of the National Health Insurance Fund, except for a small consumer tax (please see below).

To benefit from this kind of services, you should present a European health insurance card (EHIC) or a certificate provisionally replacing the EHIC, identity document and copies of the two to the respective health establishment. The data is filled in a form and, you have to sign a declaration that your envisaged stay in Bulgaria is not for the purpose medical treatment. These documents grant an access to immediately needed health care, i.e. any type of help that cannot be delayed until the planned return into the country of residence (depending on the health condition and the length of stay) based on a doctor's decision. If you don't dispose of any of the two documents, this does not deprive you of medical care in case of necessity; they may be additionally acquired from your health insurer. This may be done by you personally or with the help of by RHIF/NHIF. The respective health institution in the country of residence should then confirm the right to medical treatment by fax. If your condition does not allow waiting for confirmation, you should pay for the medical treatment. The health establishment will issue a detailed invoice which you may use in your country of residence to ask for reimbursement.

IF YOU NEED EMERGENCY MEDICAL CARE

In the event of a medical emergency, call the national emergency number 112 to request an ambulance. Based on the medical condition, the ambulance will transport the patient to the nearest or most appropriate public hospital/clinic for treatment. This service will not transport a person to any private hospital. Ambulance service can sometimes be slow. If there is a medical emergency, it may be quicker to call a taxi or ask a friend/someone to drive you to a hospital. The Bulgarian word for hospital is "bolnitsa" (болница) and for clinic is "klinika".

IF YOU HAVE A HEALTH PROBLEM WHICH REQUIRES IMMEDIATE MEDICAL CARE

Contact a general practitioner (GP) from a health institution for first outpatient medical care.

If you have a proven health problem and plan to stay in Bulgaria for a period longer than 1 month, it is recommendable to temporarily enter the list of patients (to choose) a GP from a health institution for first outpatient medical care who has concluded a contract with the National Health Insurance Fund. For that purpose, you should fill in a registration form and present it to the doctor, chosen by you.

Information on the addresses of the health institutions for first outpatient medical care, which have concluded contracts with the National Health Insurance Fund where you may select a GP, can be received from the relevant Regional Health Insurance Fund (for contact details please see below).

The GP may:

Prescribe medicines for home treatment, fully or partially paid by the National Health Insurance Fund;

Issue a document for an examination by a relevant specialist; again, only a small consumer tax (see below) should be paid to the specialist. The document may be used for up to 30 days following its issuance.

Appoint additional medical and diagnostic examinations;

Issue a document for hospitalization if the treatment cannot be performed under the conditions of outpatient medical care.

IF YOU NEED CONSULTATION WITH A SPECIALIST

If consultation with a specialized doctor is not appointed by the GP or another specialist in compliance with the procedure described above, and you still want it have one, you have to pay for it at the prices of the health institution.

IF YOU NEED MEDICINES FOR HOME TREATMENT

In case medicines for home treatment are prescribed that are fully or partially paid by the National Health Insurance Fund, and the diagnosis determined is of a non-chronic disease, the doctor issues you a prescription form: sample MH-NHIF No 5. You may receive your medicines only from a pharmacy, which has concluded a contract with the National Health Insurance Fund. Those pharmacies have the logo of NHIF on their shop windows. If the medicine is not subject to full reimbursement, you should pay the difference just like any Bulgarian citizen with health insurance.

If the medicines for the diagnosis determined are not paid by NHIF, the doctor issues me a prescription form of the Ministry of Health (MH), and I can buy them in every pharmacy.

If you have a chronic disease, your planned stay in Bulgaria is longer than one month, and you need medicines for home treatment paid by NHIF for the relevant diagnosis, you have to select a general practitioner. He/she will prepare a "Prescription book of the chronically ill person", which you have to verify at RHIF. You may receive the medicines prescribed from every pharmacy which has concluded a contract with the National Health Insurance Fund and is situated on the territory of the region from which you have selected a general practitioner. You should provide the pharmacist with two copies of the prescription form, the prescription book, your identity document and a copy of the protocol for prescription of medicines from RHIF. If the medicine is not among those fully reimbursed, you should pay the difference in the price just like any health insured Bulgarian. You can receive information on the medicines which NHIF pays fully or partially as well as on the sum you have to pay to the pharmacy in addition in the second case from the GP.

If the medicines are not paid by NHIF, the doctor can issue a prescription book – sample MH, and you may buy them in every pharmacy; the expenses may then be reimbursed by your health insurer.

IF YOU NEED SOME MEDICAL AND DIAGNOSTIC EXAMINATIONS

Contact a health institution for outpatient care. A general practitioner will examine you and issue a referral for specialized medical and diagnostic examinations. With this document, you should go to a medical and diagnostic laboratory. It may be used for up to 30 calendar days after its issuance.

If you don't have a referral for medical and diagnostic examinations, you should pay for the examinations in accordance with the prices determined by the health institution.

IF YOU NEED DENTAL HELP

You may visit every dentist who has signed a contract with the National Health Insurance Fund. For the activities not fully paid by the National Health Insurance Fund, you should pay the required amount in the same way as health insured Bulgarians.

IF YOU NEED HOSPITAL TREATMENT

The general practitioner, the specialized doctor, the dentist or a doctor at a center for emergency medical aid will issue a document (referral) for hospitalization to me. With this document, you may be admitted to a health institution for hospital care for treatment of the relevant disease which has concluded a contract with the National Health Insurance Fund.

The National Health Insurance Fund will pay for your treatment and diagnosis under a clinical path.

By admission to the hospital, you will be informed about your disease, the steps which should be taken in the process of your treatment and about the necessity to pay additionally for certain consumables, if any. You should sign a declaration for informed consent.

Your treatment under a clinical path includes no more than two control examinations after release from the hospital.

CONSUMER TAX FOR MEDICAL AND DENTAL HELP

For every visit to a GP, to a specialist or a dentist, you should pay a consumer tax amounting to 1% of the minimum salary in Bulgaria.
When you make medical tests prescribed by your GP, a specialized doctor or a dentist in a laboratory, you should pay:
A price for taking of biological material (the amount may not be higher than BGN 4 for one visit to a laboratory, no matter the number of tests);

OR

A consumer tax, amounting to 1% of the minimum wage for Bulgaria (currently BGN 4.20).
For every day of hospital treatment, you should pay a consumer tax amounting to 2% of the minimum salary in Bulgaria. If you are treated in a hospital for more than 10 days within a year, you should not pay a consumer tax for your stay there after the tenth day.
For each paid consumer tax or medical service you should require a financial document (a cash receipt or invoice).

ADDITIONAL INFORMATION FOR VISITORS OF MOUNTAIN RESORTS

If you visit a mountain resort in Bulgaria, it is recommendable to make a medical insurance for rendering first aid and transport in the case of an accident. This insurance is not included in the package of the mandatory health insurance.

DETAILED INFORMATION MAY BE OBTAINED AT THE FOLLOWING ADDRESSES:

National Health Insurance Fund - Central Management
www.nhif.bg
++ 359 (2) 965 93 87;

Sofia Health Insurance Fund (SHIF):
e-mail: sofia@nhif.bg
++ 359 (2) 965 67 76

Regional Health Insurance Fund – Sofia-district:
E-mail: sofia-obl@nhif.bg
++ 359 (2) 96 56 943

HOSPITALS IN SOFIA

FIRST AID 24/7
"Pirogov" – Specialized Hospital for Emergency Medicine - 21, Totleben Blvd.

FIRST AID - 24/7
Military Medical Academy - 3, Sveti Georgi Sofiyski Str.

FIRST AID 24/7
''Tsaritsa Yoanna" ISUL - University Hospital - 8, Byalo more Str.

"St. Anna" University Multiprofile Hospital for Active Treatment – 1, Dimitar Mollov Str.

National Heart Hospital - 65, Konyovitsa Str.

"St. Ivan Rilski" University Multiprofile Hospital for Active Treatment -
15, Acad. Ivan Geshov Blvd.

"Alexandrovska" University Multiprofile Hospital for Active Treatment -
1, St. Georgi Sofiiski Blvd.

Lozenetz University Hospital - 1, Kozyak Str.

Tokuda Hospital (private) - 51 B, Nikola Vaptsarov Blvd.

PHARMACIES IN SOFIA

The word for pharmacy in Bulgarian is "apteka" („АПТЕКА"). They usually work from 09.00 to 19.00 while pharmacies in malls - from 10.00 to 22.00. Medical prescriptions, prescribed abroad by a doctor, may be used in Bulgaria, too.

A list of 24/7 pharmacies follows:

Sofia Center
1. Medea - 233, Alexander Stamboliiski Blvd.
2. Medea - 24, Praga Blvd.
3. Adonis - 2, Maria Louisa Blvd.
   (in TSUM subway, opposite the church)
4. Violina Radkova - 6, Pencho Slaveykov Blvd.
5. Neomed - 2, Totleben Blvd., entr. B
6. Avicena - 2, Konstantin Irechek Str.
7. Ana - 95, Vitosha Blvd.
8. Aronia 2001 - 6, Pencho Slaveykov Blvd.
9. Galen 96 - 1, Skobelev Blvd.
10. Sofioter Pharmacies – Pharmacy 7 - 5, St. Nedelia square
11. Zoya - 160, Rakovsky Str.
12. Kalinovi 2003 - 33, Radovish Str., block 1, entr. 1
13. Prima - 70, Vasil Levski Blvd.
14. Aglika - 54, Maria Louisa Blvd.
15. Altea - 58, Deyan Belishki Str.
16. Krasa Bacheva - 237, Slivnitsa Blvd.
17. Remedia - 100B, Vasil Levski Blvd.

Studenski Grad district
Studentska - block 60, entr.B

Mladost district
1. Slantse - Mladost district, block 26, entr. B
2. Musagenitsa - Musagenitsa district, block 107, store no.3
3. Hera 4 - Mladost 1 district, Jerusalem Str., block 39A
4. Medea - Mladost 1A district, block 503
5. Medea - Mladost 4 district, block 418

Lyulin district
1. Mediva - Lyulin 4 district, block 447, entr.A
2. Orion - Lyulin 10 district, block 132
3. Eva - Lyulin 3 district, block 371

Krasno Selo district
1. Avicena - 2-4, Konstantin Irechek Str.
2. Tamara Marinova - 2, Maglen Str.

Lozenetz district
1. Hera - 25, Deliiska Vodenitsa Str.
2. Adonis - 21, Kozyak Str.
3. Pupi - 19, Viskyar Planina Str.
4. Medea - 14, Cherni Vrah Blvd.
5. Medea - 64, Bigla Str.

Ovcha Kupel district
1. Panaceia - Ovcha Kupel 1 district, block 507, entr. D
2. Medea - Ovcha Kupel 1 district, block 527, entr. D

Emil Markov district
Farma - Kostenski Vodopad Str., block 242, opposite Polyclinic XXIX

Hadzhi Dimitar district
1. Aster Group - Makgahan Str., block 71, entr. G
2. Hera - 51, Makgahan Str.

Hipodruma
Adonis – 1, Urvich Str., block 121

Suha Reka district
Hera - Alexander Ekzarh Str., block 225, entr. G

Obelya district
Medea - Obelya 2 district, block 264, entr. A

Ilinden district
1. Alya - Block 135, entr. B
2. Medea - Block 129, entr. B

Razsadnika district
Medea - 233, Stamboliiski Blvd.
Vazrazhdane district
Arkus - 28, Ekzarh Iosif Str.

Darvenitsa district
Colibri - Block 46, entr. A, fl. 11, ap. 52
Druzhba district
Hera - Druzhba II district , 25, Deliiska Vodenitsa Str.

St. Troitsa district
1. Farma Lyubomir Georgiev - Gabrovo Blvd., block 373
2. Prima - Block 131-Б
3. Medea - Gabrovo Blvd., block 347Б, entr. 1

Banishora district
1. Adonis - 33, Radovish Str.
2. Louisiana - 136, Hristo Botev Blvd.

Strelbishte district
Medea - 123, Nishava Str.

Manastirski Livadi district
Medea - 98, Bulgaria Blvd.

Reduta district
Medea - 77, Velcho Atanasov Str.

Beli Brezi district
1. Medea - 23, Doyran Str.
2. Galateya - 18, Doyran Str.

Borovo district
Medea - 52, Rodopski Izvor Str.

Slatina district
Roni Pharm - 4, Temenuga Str.

Gotse Delchev district
1. Prima - 3, Gotse Delchev Blvd.
2. Adonis - 64, Deyan Belishki Str.

Slivnitsa district
Hygia - 12, Vasil Levski Str.

Nadezhda district
1. Barakat Ol Pharmacy - Nadezhda 2 district, block 264, entr. A

Hristo Smirnenski district
Velislava Alexandrova Pharmacy - Block 43A, entr. A

Part II

BULGARIAN ACADEMY OF SCIENCES

The Bulgarian Academy of Sciences was established as early as 1869, while Bulgaria was still under Ottoman rule. Nowadays, it comprises 42 scientific units (institutes, centres, laboratories) in almost all branches of science. It is a higher education institution entitled to teach doctoral students. In fact, it is the biggest PhD training school in the country. The Academy does not teach at MA or BA level. It has been participating in Erasmus programme since 2009-2010.

ERASMUS OFFICE

Bulgarian Academy of Sciences
Central Administration
1, 15 November Str., Sofia 1040,
1st floor, room 103
Office hours: open door policy

Institutional Coordinator:
The Scientific Secretary-General:
Prof. DSc Evdokia Pasheva,
Tel. (+359 2) 979 5231
E-mail: *eva@bio21.bas.bg*

Erasmus Coordinator:
Tomina Galibova
Chief Expert
Staff mobility, Incoming mobility
Agreements with Programme countries
Tel. (+359 2) 979 5387
E-mail: *tominaglb@cu.bas.bg*

Erasmus Assistant:
Vesselina Tzvetanova
Junior Expert
Student mobility and
Agreements with Partner countries
E-mail: *tzvetanova@cu.bas.bg*

Visas and insurances:
Plamen Stefanov
Expert
E-mail: *stefanov@cu.bas.bg*

The administration of the Erasmus mobilities of students is centralized in contrast to Teaching and Staff Training mobilities.

TUITION TAXES

Incoming Erasmus students - whether or not they receive an Erasmus+ EU grant for their participation - are exempted from paying fees for tuition, registration, examinations and access to laboratory and library facilities at BAS. However, small fees may be charged for costs such as insurance and the use of miscellaneous material such as photocopies, laboratory products, on the same basis as these are charged to local students.

LANGUAGE OF INSTRUCTION:

All the courses are taught in Bulgarian, part of them – in English and some courses can be taught in other languages, too, such as Russian, German, French upon a personal arrangement with the lecturer. No language certificates are required. The minimum recommended level by the EC is B1.

APPLICATION PROCEDURE

To be eligible to apply, you should be a PhD student at your home institution. Bachelor or Master students are not accepted. There should be an Agreement signed between the Academy and your home institution in the area of knowledge that you study. Your home institution should nominate you by e-mail. Nominations may be made year-round. The nomination should include minimum your names, a confirmation that you are PhD student, your contact details and the proposed period of study. You will then be invited to fill in an application form:

BULGARIAN ACADEMY OF SCIENCES

ERASMUS APPLICATION FORM - PhD STUDENTS

APPLICATION DEADLINE: YEAR-ROUND

AFTER NOMINATION BY YOUR HOME INSTITUTION,

PLEASE SEND, SCANNED, TO:

E-mail: *tominaglb@cu.bas.bg*

(*Photo optional*)

STUDENT'S PERSONAL DATA

(Family name: (Mr/Ms).....

Date of birth: .....

Sex: ..... Nationality: .....

Place of Birth: .....

Current address: .....

.....

Current address is valid until: .....

Tel.: .....

First name (s): .....

Passport № .....

Date of issue: .....

E-mail: .....

Permanent address (if different): .....

.....

.....

Tel.: .....

SENDING INSTITUTION AND ERASMUS CODE: .....

FIELD OF STUDY: .....

Please see http://www.uis.unesco.org/Education/Documents/isced-fields-of-education-training-2013.pdf (it should correspond to the one in the Agreement between the institutions)

NAME OF THE INSTITUTE OF BAS TO BE VISITED (if you know it; please see: www.bas.bg)

.....

.....

LANGUAGE COMPETENCE

Mother tongue: ..... **Language of instruction at home institution (if different):** .....

Other languages	**I am currently studying this language**		**I have sufficient knowledge to follow lectures**		**I would have sufficient knowledge to follow lectures if I had some extra preparation**	
	yes	**no**	**yes**	**no**	**yes**	**no**
.....	☐	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐	☐
.....	☐	☐	☐	☐	☐	☐

PROPOSED DATE OF ARRIVAL: ..... **PERIOD OF STAY:** .....

STUDENT'S SIGNATURE

..... **Date:** .....

It can be downloaded from the website of the Academy, www.bas.bg, after clicking on the sign "Erasmus+" down in the left pane and opening the folder "Incoming Erasmus". Having filled it in, you should sign, scan and send it by e-mail to the Erasmus Coordinator. You can find the course catalogue in the same folder. You may choose courses equaling to no more than 40 ECTS credits per 5 months. There are no semesters at the Academy because of the specifics of doctoral training. Courses are taught as soon as there is a group of 5 PhD students. When the students are fewer than 5, courses are held in the form of consultations/reading. You may choose any course in your area of knowledge, no matter which unit of the Academy organizes it. The units of the Academy - which correspond to faculties at universities - are its institutes, scientific centres and laboratories.

Please indicate in your e-mail whether you want accommodation (for opportunities see below).

Upon confirmation of the course organizer, a confirmation e-mail for your acceptance will be sent to you by the Erasmus Coordinator. Your Learning Agreement will be signed by your home university, by you and by the Institutional Coordinator of the Academy before your arrival. Scanned signatures are accepted within the programme in most of the cases. You can receive the form of this mandatory document from your home institution.

AFTER ARRIVAL

When you arrive in Sofia, please go to the Erasmus office without any delay (on the day following your arrival). You should visit the Office on the day prior to your departure, too. You will receive a Certificate of Attendance indicating your length of stay. The period should comprise at least 90 days or you will be required to return the whole financial support to your home institution. This document should be in original.

The second document you are going to receive from the Erasmus office is your Transcript of Records: the third part of the Learning Agreement which indicates the courses you have taken and the ECTS credits you have received. Please contact the Erasmus Coordinator as soon as you finish your courses/your work on the PhD thesis (an e-mail is enough). Contrary to the first two parts of the Learning Agreement which may be scanned, this one should be in original, too. You may receive that by post as well within 5 weeks if it is not ready at the time of your departure but in most cases you will dispose of it before going back.

GRANDING SYSTEM

ECTS grade	Local grade	Bulgarian – in words	English – in words
A	**6** **5.50**	**ОТЛИЧЕН**	**EXCELLENT** **Outstanding performance**
B	**5** **4.50**	**МНОГО ДОБЪР**	**VERY GOOD** **Above the average standard but with some errors**
C	**4** **3.50**	**ДОБЪР**	**GOOD** **Generally sound work with a number of notable errors**
D	**3**	**СРЕДЕН** **(*ЗАДОВОЛИТЛЕН*)**	**SATISFACTORY** **Fair but with significant shortcomings**
E	**2.50**	**СРЕДЕН** **(*ДОСТАТЪЧЕН*)**	**SUFFICIENT** **Performance meets the minimum criteria**
F	**2**	**СЛАБ** **(*НЕДОСТАТЪЧЕН*)**	**FAILED** **Substantial improvement necessary; requirement of further work**

Examinations at the Academy may only receive two grades:
P – Pass
F – Fail

ACCOMMODATION

The Academy can accommodate Erasmus students in the House of Scientists (hotel of BAS) at preferential prices. The normal price is 25 Euro per night (for guests of the Academy), incl. breakfast. Students who are going to reside there for at least 3 months may use a reduction of 30%. The hotel is situated on 50, Shipchenski prohod Blvd., http://**www.domnaucheniya.com**/

Budget accommodation in Bl. 60, Studentski grad district, might also be available. A notice of at least 1-2 months in advance is a prerequisite. The price is 150 BGN (75 Euro) per month. Places are limited.

INFORMATION AND COMMUNICATION SCIENCES AND TECHNOLOGIES

Institute of Mathematics and Informatics (IMI)

1113 Sofia, Acad. G. Bonchev St., Bl. 8;
Tel. (+359 2) 979 38 28, Fax: (+359 2) 971 36 49
E-mail: *director@math.bas.bg*
URL: http://**www.math.bas.bg/**

The Institute of Mathematics and Informatics carries out fundamental and applied research, consultative and expertise activities, implementation of the obtained results and education and training of highly qualified specialists in the field of mathematics and informatics. The results obtained are in the fields of algebraic structures, algebraic geometry, theory of numbers, 21 approximation theory, numerical methods, mathematical physics, real and complex analysis, theory of probability and mathematical statistics, optimization theory, theory of encoding and theoretical informatics. The existing scientific schools on the topics mentioned above have gained worldwide prestige.
Main areas of research: Pure mathematics Mathematical modelling Theoretical and applied informatics

FACILITIES

A local network of more than 150 working places for the needs of the Institute of Mathematics and Informatics, the Laboratory of Telematics, the National Laboratory of Computer Virology and the TEMPUS, UNESCO, NATO, FP6, FP7 and other international projects for ensuring fast access to Internet.
Three computer classrooms with 40 workplaces.
High-technology laboratory equipped with the latest generation multi-core Intel processors, 4 multi-core servers and 22 workplaces.

DEPARTMENTS

Algebra and Logic
Research and scientific supervising of PhD students and specialists in the area of algebra, algebraic geometry and algebraic number theory, recursion theory, non-classical logic, and applications in informatics and engineering.

Analysis, Geometry and Topology
Research and training in the theory of analytic functions of one and several complex variables, complex geometry, and applications of analysis, geometric function theory, functional analysis, spectral theory of operators and its applications.

Differential Equations and Mathematical Physics
Investigations and studies of the properties of linear and non-linear differential equations (with partial derivatives, ordinary, dynamic systems, etc.). A number of phenomena in nature (physics, chemistry, biology) and in society (economics) result in problems leading to the use of linear equations. Examining the solutions of ordinary and partial differential equations with applications in physics and biology by means of analytical and numerical methods via Cellular Neural Networks.

Education in Mathematics and Informatics
Research in mathematical education, development and application of novel technologies and computer media in teaching mathematics and informatics and training of pupils with special interest in mathematics.

Mathematical Modelling
Approximation theory, its applications in numerical methods and the theory of the mathematical modelling.

Probability and Mathematical Statistics
Theory of stochastic processes - branching processes and estimations, combinatorial probabilities, asymptotic enumeration, extreme processes, diffusion and other characterization problems, statistical investigations and applications.

Operations Research
Research and education in the field of operations research, optimal control, development of applicable software.

Computational Mathematics
Numerical methods for partial differential equations and mathematical modelling of physical, ecological and technological processes.

Biomathematics
Mathematical modelling in biology under uncertainty conditions (dynamical models of ecological, physiological, biochemical and other processes), numerical methods and algorithms with result verification, methods of operations research, computer arithmetic, programming languages and systems of computation.

Information Systems
Research, education and applications in the field of: information systems, multimedia, telecommunications, multi-agent systems and cognitive science.
The Laboratory „Digitization of scientific and cultural heritage" deals with long-term preservation and digitization of the Bulgarian mathematical and cultural heritage. Participation at the interdisciplinary expert council at the Ministry of Culture for the elaboration of a national digitalization strategy.

Software Engineering
Research, applications and education in the field of software engineering, evaluation of Software quality, benchmarking, software certification, specification languages, multimedia, object modelling and query optimization, software marketing, computer-aided education and modelling.

Mathematical Linguistics
Research, applications and education in the field of computational linguistics and mathematical modelling of formal and natural languages, development of TEI-compliant language resources, lexical databases for integrated multilingual resources, multilingual digital dictionaries, building of intelligent computational tools for knowledge discovery, computational morphology, knowledge processing technologies and semantic web applications, language and multimedia technologies, digital libraries for application in the management of digitized cultural-historical content, knowledge delivery systems, interactive e-learning systems, computational modelling of Bulgarian ethnological knowledge.

Mathematical Foundations of Informatics
Research, implementation and education in the field of coding, cryptography, combinatorics and computer algebra.

Informational Modelling
Research and developing of concepts, methods and tools for designing, description, implementation, verification, simulation, validation, optimization and application of informational models. Creation and research of informational models of specific technical, biological, economical, social, and mixed systems, aiming at their investigation, design, control and optimization.

Library
Specialized library in the field of mathematics and informatics, with about 90 000 volumes. Provided subscription for Zentralblatt, SCOPUS, Science- Direct, MasthSci+ on Silver Platter (installed on a computer). The electronic database of All-Russian Institute of Scientific and Technical Information is available for BAS through the site **www.index2000.bg.**
IMI was founded in 1947.

Institute of Information and Communication Technologies (IICT)

1113 Sofia, Acad. G. Bonchev St. Bl. 2;
Tel. (+ 359 2) 979 66 11, Fax: (+ 359 2) 870 72 73
E-mail: *iict@bas.bg*
URL: http://**www.iict.bas.bg**

The Institute of Information and Communication Technologies is a national centre for the development of modern information and communication investigations. The mission of the Institute is to conduct fundamental and 25 applied research in the field of Computer Science and Information and Communication Technologies (ICT), directly related to the main national and international priorities, as well as the development of innovative interdisciplinary applications of these technologies.
IICT carries out important national and operational activities. It controls and supports two Points-of-Presents (PoP) nodes of the Bulgarian Research and Educational Network (BREN) that provides access via high speed Internet for researchers, teachers and students to huge information resources from over the world. The network provides direct access to international projects, qualification and use of E-learning resources. IICT also supports and controls the National GRID Infrastructure (NGI), which provides Bulgarian and foreign researchers for free with the main GRID resources and services needed for solving research problems and teaching PhD and graduate students. The researchers can use the NGI for developing applications requesting significant computing resources under the methodological assistance and training of the IICT.

EQUIPMENT

Local Area Ethernet Network with speed of 1 Gb/s. The BREN node is served by 3 Cisco routers and 6 servers. The external connectivity of this node is carried out by the PoP node of the GEANT European Academic Network, located in the IICT premises, which is connected by 10 Gbps lines with Athens, Bucharest and Budapest and with 2,5 Gbps line with Istanbul. The GRID resources include 3 computer clusters: 36 blade servers with 2 Intel Xeon X5560 2.8 GHz quad-core processors (a total of 288 processor cores), 24 GB RAM, 8 storage servers (Intel X5560 2.8 GHz, 32 GB RAM), 48 TB SAN storage, interconnected with high-performance low-latency DDR Infiniband interconnect.
28 servers with 2 quad-core Intel Xeon E5430 2.66 GHz processors per server, 16 GBytes RAM, 2 dual CPU support servers 40 dual CPU servers with 4 GB RAM each, interconnected with high performance low latency Myrinet interconnect.

DEPARTMENTS

Computer Networks and Architectures
Development and application of modern information and communication technologies. Development of server clusters. Facilities for network security. Monitoring and control of computer networks.

Parallel Algorithms
New effective parallel algorithms. Monte Carlo algorithms. Computational geometry and topologic graph theory. Metaheuristic and stochastic methods. Application of parallel algorithms and high-performance computations.

Scientific Computations
Large-scale computer simulations. High-performance computer architectures and algorithms. Numerical methods for differential equations. Computational linear algebra. Iterative methods for systems with sparse matrices. Applications in science, engineering and ecology.

Mathematical Methods for Sensor Information Processing
Smart multi-sensor signal and image processing. Video-analytic technologies, multi-object identification, recognition, tracking, behaviour estimation and event prediction. Multisensor data fusion. Decision making under uncertainty, conflicts or/and paradoxes.

Linguistic Modelling
Computer modelling of natural languages with a focus on Bulgarian. Formal methods for processing of linguistic knowledge (finite-state automata, HPSG-grammars). Standardization of linguistic resources. Knowledge-based applications for automatic processing of natural language.

Information Technologies for Security
Interlinks between advanced ICT and security. Security and defence policy, security sector transformation and operations. Architectures, capability planning, modelling and simulations. Cyber security and critical infrastructure protection. ICT governance and change management.

Grid Technologies and Applications
Grid middleware components and systems. Methods, algorithms and distributed applications in grid environment. Methods and algorithms for processing large volumes of data. Cloud computing and new generations of grid systems.

Technologies for Knowledge Management and Processing
Novel architectures for semantically-enabled web service oriented applications. Knowledge-based systems. Machine learning and data mining. Case- based reasoning. Distributed multimedia e-learning environments.

Optimization and Decision Making
Optimization and multi-criteria decision making. Local and web-based optimization and decision support systems. Linear algebra and matrix theory. Global heuristic strategies and approaches. Neural networks. Mathematical models for production scheduling and inventory control.

Signal Processing and Pattern Recognition
Image, video and speech analysis and recognition, content based image/object retrieval (CBIR/CBOR) from databases of 2D and 3D objects. Biometric based identification, neural networks for classification, computer assisted medical diagnostics.

Information Processes and Systems
Operations research methods for modelling, design and control of processes and systems. Modelling and optimization for engineering systems - renewable energy sources, night vision devices, optimal production scheduling. Digital signal processing and reprogrammable logical devices for signal processing and VHDL. Methods and software tools for e-learning, web- based applications and web design.

Intelligent Systems
Methods for analysis and sythesis of complex intelligent information and control systems, based on dynamic ontologies. Multi-agent systems. Soft- sensing.

Embedded Intelligent Technologies
Micro-processor information and control systems. Real-time systems. Robotized systems. Medical robotics. Wireless sensor networks. Industrial automation systems.

Communication Systems and Services
Sensor information systems. Personalized technology enhanced learning. Reliable, secure and resilient computer systems and networks. Compression, processing, recognition and security of digital visual information.

Hierarchical Systems
Design, control and exploitation of multilevel systems with hierarchical structure. Algorithms for optimal control of computer, transport, economic and software systems. Advanced information technologies for automation of business activities.
IICT was founded in 2010 by merging of the Institute for Parallel Processing of Information (founded 1985), the Institute of Information Technologies (founded 1994) and the Institute of Computer and Communication Systems (founded 1994).

Institute of Mechanics (IMech)

1113 Sofia, Acad. G. Bonchev St., Bl. 4,
Tel. (+359 2) 979 64 20, Fax: (+359 2) 870 74 98
E-mail: *director@imbm.bas.bg*
URL: http://**www.imbm.bas.bg**, http://**www.info.imbm.bas.bg**

The Institute of Mechanics is a national multi-profile institute, carrying out fundamental and applied scientific research in the field of mechanics, robotics, mechatronics, biomechanics and the bordering interdisciplinary areas. The research topics of the Institute evolve in accordance with the global and European trends in mechanics.

EQUIPMENT AND METHODS

cluster of 24 CPU, based on LINUX laser system for measuring displacements and deformations in solids and liquids by speckle interferometry, device for testing the tension in solid materials equipment for non-destructive measurement and testing of physical and mechanical properties of materials and structures based on acoustic, ultrasonic, magneto-acoustic-emission and magnetic noise methods device and method for non-destructive testing of physical and mechanical properties of ferromagnetic materials robot for micro and nano-manipulations with 7 degrees of freedom system for visual control of micro-robots Carl Zeiss reverse microscope device and method for rheological measurements of physiological fluids biomechanical system for functional rehabilitation of patients- paraplegics universal device for mechanical and tribological tests thermo camera, UMT-2M equipment for nanoidentation (UNMT) with AFM (Ambios Technology) and profile meter (PR05003D)
G200 Agilent Foculus Nanoindentor computation of three-dimensional design of optimal orthoses and implants Monte Carlo methods for simulation of gas flows in MEMS computer design methods of hypoid gears laboratory facilities for experimental research and physical modelling of technological processes in systems for hydro-transport and irrigation computer-controlled systems artistic fountains

DEPARTMENTS

Mechanics of Discrete Systems
Theoretical and experimental research on the mechanics of discrete systems, control theory, theory of mechanisms and machines, robotics and mechatronics. Computer and experimental methods for optimal synthesis and control of technical systems - manipulators, robots, mechatronic and biomechanical systems with different applications. Mathematical modelling oriented to the synthesis of mechanical systems, carrying out regular transformation of movements and/or permanent technological processes. Mathematical models aimed at reconstructing dynamic processes accompanying transport accidents, crimes, industrial accidents and others. Modelling and computer simulation of high-tech systems and smart devices and machines. Approaches and algorithms for technological adaptation and virtual prototyping of mechatronic systems. Methods and specialized mechatronic and biomechatronic systems for use in industry and medicine.

Fluid Mechanics
Mathematical modelling and numerical simulation of flows of liquids and gases occurring in technological and chemical processes and in the environment. Dynamics and stability of capillary jets and drops, thermal and concentration- capillary instability of single- or double-layer systems of viscous liquids and binary mixtures. Magneto-hydrodynamic and electro-hydrodynamic instability of magnetic and dielectric fluids. Linear and nonlinear time series analysis of the evolution of the characteristics of fluid systems. Methods for analytical and numerical solution of nonlinear differential, integral and integral-differential equations associated with the description of fluid systems. Application of mathematical tools for the study of kinematics, dynamics and evolution of complex mechanical, chemical, biological, economic and social systems.

Mechanics of Deformable Solids
Mathematical modelling and numerical simulation of the stressed-strain state of multifunctional and composite materials taking into account the thermal load, coupled thermo-mechanical and electro-mechanical and piezoelectric effects and the presence of soft deformations. Methods for exploring the destruction of material and change of its structure in the technological processes of plastic forming. Investigation of the micro-and nanostructure of materials and simulation of their thermal and mechanical characteristics. Loss of stability of soil massives and location of the non-elastic stresses. Hydro-mechanical models for soil materials. Dynamics and stability of structures with non-elastic properties at large deformations; distribution of waves in inhomogeneous environments; dynamic interaction between structures and fluids; mechanics of fracture of fibrous composites; micromechanics of bones, diffusion and sorption in porous media, numerical modelling of coupled fields as dynamic thermoelasticity, thermoelastoplasticity, piezoelectricity and consolidation. Experimental techniques for nondestructive testing of materials and structures (tanks, pipelines), laser-based optical, ultrasonic, electromagnet, and acoustic-emission methods. Mathematical modelling and numerical analysis of contact and coupled problems in elasticity and plasticity, describing technological processes.

Biomechanics
Structures and functions of the human body at the macro-, micro- and nano-level. Biomechanical study of the dynamic and rheological properties of DNA and protein molecules. Bio- and hemorheological and electrorheo- logical studies of cells, tissues and systems aimed at the understanding the mechanisms of structural interaction, the development of methodology and improved diagnostics in socially significant diseases such as atherosclerosis, cardiovascular and cerebrovascular diseases, and cancer. Improving diagnosis and therapy of diseases such as orthopedic injuries, hernias, and the properties of hernias lanes. Biomechanical research of the dynamics of various biological processes involving microorganisms. Modelling the human body and simulation of human movements; 3D modelling, design and optimization of passive and active orthoses, prostheses and other technical means of rehabilitation. Methodologies for structural and parametric identification of dynamic models for the control and optimization of human movements. Studies on optimal control of purposeful movements for efficient motor and neurological rehabilitation.

Physico-Chemical Mechanics
Creation and evaluation of the properties of non-metallic composite polymer materials (polymer composites, fibrillated and reinforced polymers, polymer foams), nano-materials (polymer nanocomposites, nanostructured materials) and silicate materials (quick-and high-strength concrete, self-compacting concrete, concrete fibrillated and reinforced concrete and silicate materials with combined use of industrial wastes). Rheology of nanodispersions, suspensions and colloidal systems. Investigation and control of the degree of dispersion of the nanofillers in the polymer. Mechanical behavior, physical- chemical interactions, structure and mechanical properties of composite materials. Solving of technological and structural problems. Development of new composite materials.

Mathematical Modelling and Numerical Simulations
Models, algorithms, numerical schemes and software for testing and visualization of processes, phenomena, forces and interactions in the field of mechanics. Analysis by the methods of statistical mechanics of the thermodynamic and mechanical properties of multiple particle systems with phase transitions and critical phenomena. Study of non-equilibrium phase transitions and the emergence of self-organization criticality in model systems. Monte Carlo simulations and analytical methods. Transport processes - theoretical and computer simulation and analytical methods, theoretical and numerical modelling. Mathematical modelling of processes and interactions, properties and behavior of low-dimensional fluid systems, as elements of micro-and nano-systems and devices. Numerical schemes and algorithms for specific application of the Monte Carlo methods for investigation of flows of dilute gas and gas micro-channel MEMS. Stochastic processes of transmission; phenomena characterized by the emergence of self-organiza- tion criticality (avalanches, earthquakes), etc.

Institute of System Engineering and Robotics (ISER)

1113Sofia, P.O.B 79, Acad. G. Bonchev St., Bl. 2;
Tel. (+359 2) 873 26 14,(+359 2) 872 35 71, Fax: (+359 2) 870 33 61
URL: http://**www.icsr.bas.bg**

The activity of the Institute of System Engineering and Robotics is directed to: Creation of knowledge, ideas, inventions and know-how corresponding to the priorities of the European Commission in areas like sensors, micro- and nano-systems, robotics, mechatronics, bioprocesses; measurement technologies, embedded intelligent systems, etc. Completing the full cycle by implementing the principle „science to the key" - from the idea and the invention via scientific investigation to the prototypes and technology transfer into industry.
Participation in the modernization of military equipment, technology and products of dual application for the needs of the Bulgarian Army according to the NATO standards and cooperation with the corresponding ministries and state organizations in these strategic spheres; consultations to governmental bodies on issues of the national security and antiterrorist policy.
Synthesis of new approaches, theories, models and end technologies in the field of bioprocesses via the investigation of the cell functions, acquisition of new information about certain syndromes, improvement of the control of complex biotechnological industries related to the production of bio-fuels from renewable sources.
Application of new and universal models and frameworks for evaluation of solutions and improvement of the efficiency of the energy sector and the municipal infrastructure of the city of Sofia according to the requirements of the European Commission.
Development of advanced scientific methods, algorithms and applied means for intelligent control, including Web-based architecture for tele-control of autonomous mobile objects, wireless communications and technologies, etc.
Implementation of innovative solutions for design of new devices for extraction of energy from the sea waves and slow rivers. Energy-saving mechanisms with accumulation of mechanical energy. Low-cost piezodriven micromanipulators.
Research and development of mechatronic and robotized systems, executive devices and instruments with microprocessor control for multifunctional purposes for industrial use, energy, medicine, food, pharmacology and light manufacturing, ecology, security and military purposes.
Design of innovative: systems for transfer and storage of energy from renewable sources; devices for energy storage based on nanostructure components; systems for control of the energy of automobiles and small aircrafts; integrated components for energy conversion; bioreactors for cultivation of 3D cell cultures.

LABORATORIES:

Atomic Force Microscopy
Complex experiments on the properties and characteristics of surfaces, thin films and layers of metals, semiconductors, or fluids. It has a unique for Bulgaria Atomic-force microscopic system, which is the latest generation of this type of measurement equipment.

Magnetic Measurements
Design and construction of magnetic field, temperature and light microsensors and microsystems based on Hall's principle, magnetotransistors, magneto-diodes, multisensors, etc. The laboratory uses a unique Weiss type electromagnet.

Sensor Interfaces
Research, experiments, tests, and high-precision measurements aimed at application of the sensor systems and devices in robotics and national security.

Contactless Automation
Experimental research for designing new modifications of contactless devices and systems for measurement of electric current, power and energy, as well as contactless instruments for linear and angular displacement.

Thermic Investigations
Research of temperature influence on the mechanical and operational characteristics of sensors, devices and instruments.

Electrical Measurements
High-precision experimental research of electric current, voltage, noise characteristics, and critical work regimes of sensors and microsystems developed at ISER.

Mechatronics
Development of innovative robotized devices for adaptive conversion of energy from sea waves.

Service Robotics
Research, design, analysis and development of professional, personal, educational and leisure, and hobby service robots.

Biotechnological Laboratory
Equipped with a column bioreactor with immobilized cells for bio-ethanol production; peristaltic pumps for nutrition media and other reagent feeding for control of physical-chemical parameters; devices for programmable logical control of these parameters; BIOSTAT® B plus integrated system and LabView software for digital process control.

Ecological Monitoring
Interdisciplinary investigations of the air pollution, water purity and food quality by means of sensor control and measurement technologies.

DEPARTMENT
System Engineering

Sensors, Actuators and Measurement Technologies
Design, investigation and application of specialized sensors, micro- and nano-systems, intelligent sensor-information systems, actuators and interfaces; contactless automation; sensor and actuator specialized hardware; contactless measurement of electric current, power and energy for the power industry and electrical automobiles; engineering solutions at the level of inventions and innovations; antiterrorist solutions and technologies.

Bioengineering
Development of innovative solutions for control design of biotechnological, ecological and chemical processes in the food and pharmaceutical industries, as well as for bio-fuels production from renewable sources. Design, analysis and processing of data bases for these processes, derivation of models and their application for synthesis of software sensors, methods and algorithms for optimal, adaptive and robust control aiming at increasing industrial efficiency.

Integrated Systems
Investigations and design of integrated systems for command and control in the fields of security and defense; systems for acquisition, processing and information exchange in real time; integrated simulation systems and control of dynamic systems based on intelligent technologies. Approaches: operational and system analysis, distributed computer simulations, MDA software design, risk assessment, soft computing, etc.

Hybrid Systems
Systematic and applied research for innovative modelling and control of hybrid systems: technological, ecological, medical, human-machine, communication, etc. Approaches: model predictive control, theory of positive systems, soft computing, statistical methods and assessment of environmental impacts of products, processes and technologies.

DEPARTMENT
Mechatronics and Instrumentation

Robotized Executive Mechanisms and Intelligent Systems
Development, design and application of innovative mechatronic devices and robotized systems and their basic components, connected with the latest achievements in the mechatronic approach.

Unique Instruments, Components and Structures
Scientific and applied specialized devices, instruments, components and structures of systems for control of processes, energy and motion; interface systems; intelligent terminals, controllers; systems for data acquisition and processing.

Mechatronic Technological Systems
Development and realization of innovative ideas and technologies in the areas of: renewable energy, mechanics and hydrodynamics.

Modelling and Fractal Analysis of Information Systems, Complexes and Networks
Mathematical methods for modelling and fractal analysis aimed at scientific research on information exchange and traffic in modern systems, complexes and networks for high-speed exchange of information, as well as implementation of hardware and software for encryption and compression in data exchange.

ISER was founded in 2010 by merging of the Institute of Control and Systems Research (founded 1994) and the Central Laboratory of Mechatronics and Instrumentation (founded in 1990 as an Institute of Mechatronics).

National Laboratory of Computer Virology (NLCV)

1113 Sofia, Acad. G. Bonchev St., Bl. 8;
Tel. (+359 2) 971 37 10
E-mail: office@nlcv.bas.bg
URL: http://**www.nlcv.bas.bg**

The National Laboratory of Computer Virology is the only research unit in Bulgaria specialized in the area of computer virology, and computer, communication and information security. As a scientific discipline, Computer virology is based on the achievements of several disciplines as mathematics, informatics, physics, chemistry, astronomy and recently also biology of cellular organisms and genetics of microorganisms. All world organizations related to the world of computers, communication and information, make serious investments in the competition „virus-antivirus", because the results will determine to a large extent the future of computer, communication and information systems. In recent years this is particularly relevant as the idea of a biological behavior of the computer viruses became a reality, and when self-coding and self-mutation algorithms approached the computer viruses to the model of biological cells and organisms. Recently the classical term computer viruses has been transformed into the generalized term malicious software. It includes more than 60 main kinds, more than 2000 families and more than 5000000 virus signatures. Compact programme implementations for several platforms are built in the Laboratory. These programme implementations detect and cure „in the wild" the set of virus signatures. The programme realizations also provide effective „monitor" and „integrity checker" protection with minimal loss of resources.

Main priorities:
Examination and classification of new computer viruses (malware, malattacks)
Methods and means of computer viruses discovery and removal Methods and means for computer data recovery Approbation of methods and means
Examinations in the area of coding standards Examinations in the area of Access Control Systems Examinations in the area of client/server applications

METHODS

Assessment of Operation environments influence - definitions and parameters
Examination of particular category of computer viruses - definitions and parameters
Creation of analytic models - simplifications and verifications Optimization processes - function, parameters and experiments Creation of simulation models-simplifications and verifications Optimization processes - function, parameters and experiments Algorithmic solutions and programme realization for particular category of viruses
Building of programs and monthly update of the NLAB product family

DEPARTMENTS

Computer Security
Methods and means for discovery and removal of computer viruses and their varieties from computers and computer systems with different operating systems and platforms.

Communication Security
Methods and means for network protection from computer viruses and their varieties in computers and computer systems with different operating systems and platforms.

Information Security
Methods and means for information security in computers and computer systems with different systems and platforms.

NLCV was founded in 1990.

Laboratory of Telematics (LT)

1113 Sofia, Acad. G. Bonchev St., Bl. 8,
Tel/Fax: (+359 2) 870 72 73

The Laboratory of Telematics is responsible for the staff training and for the application of information and communication technologies in BAS. It carries out education of PhD students and specialists from BAS. Develops information systems, network solutions and services, databases and different applications needed for the BAS research units. Performs interactive and distance learning. The Laboratory has developed and realized education programs in computer literacy, as well as specialized courses on the modern trends in the field of information technologies. The education covers 15 programs: WEB graphics and design, based on HTML, JavaScript and Flash, as well as a cycle of courses on image processing with Photoshop, CorelDraw and Adobe Illustrator. The Laboratory provides training of system administrators in Windows 2000 Server, MS Exchange, and courses in programming in the languages Java, C, C Sharp, Visual Basic, C++, (including NET versions).

DEPARTMENTS

Communication and Information Hardware and Software and Intranet Applications
Development of the network infrastructure of part of the BAS institutes, specialized schools in the country and the divisions of the Bulgarian Army.

Educational Telematics
IT education of the Ph.D. students and specialists from BAS, implementation of information technologies based on Microsoft solutions.

Software Development, Internet Graphics and Design
Development of database systems for different applications in the scientific libraries of BAS. Design of web sites for units of BAS and for external clients

LT was founded in 2000 as a successor of the Computer Centre of BAS (founded 1995).

ENERGY RESOURCES AND ENERGY EFFICIENCY

Institute of Nuclear Research and Nuclear Energy (INRNE)

1784 Sofia, 72, Tsarigradsko shose Blvd.;
Tel. (+359 2) 979 55 50, Fax: (+359 2) 975 36 19
E-mail: lnrne@inrne.bas.bg
URL:http://**www.inrne.bas.bg**

The Institute of Nuclear Research and Nuclear Energy carries out scientific and applied investigations in physics, which are in line with the modern tendencies in the following fields:

Theory of elementary particles, atomic nucleus and quantum phenomena; string, soliton, gauge and other integrable models.
Experimental physics of high energy elementary particles.
Nuclear physics and nuclear reactions, positron annihilation and semiconductor detectors.
Neutron and reactor physics and the problems of optimization and safety of nuclear reactors.
Nuclear energetics and its relation with alternative energy sources Nuclear methodologies and their applications.
Dosimetry of mixed radiative fields, radioecology, environment monitoring, radiochemistry.

METHODS

Precise quantum physical and radiochemical analysis Modelling of physical, chemical and radiation processes Development and production of nuclear devices and semiconductor detectors

APPARATUS AND EQUIPMENT

Electronic network with workstation
Detectors for analysis of particle and gamma radiation systems
Low-background gamma spectrometer
Mass-spectrometer
Gas chromatograph with mass-selective detector Neutron defractometer and neutron polarimeter X-ray diffractometer

FACILITIES

Nuclear scientific-experimental and education center
Basic environmental observatory "Mussala"

DEPARTMENT

Theoretical and Mathematical Physics

LABORATORIES:

Theory of Elementary Particles
Quantum field theory, quantum groups and quantum statistics; conformal and superconformal symmetry in field theory and string theory models; new aspects in string theory and gravity - black holes and brane worlds, exact solutions of Einstein equations; integrable systems; theory and phenomenology of elementary particles.

Mathematical Modelling
Mathematical models for spectroscopy and reactions of exotic atoms and molecules at low energies, quantum field and gravitation theory, physical chemistry processes in the atmosphere etc. Efficient computer algorithms for the numerical investigation of these models.

Solitons, Coherence and Geometry
Soliton equations and soliton interactions, optical solitons, differential- geometric structures and applications in gauge field theory and gravitation physics, energy and momentum tensors, soliton-like solutions in extended electrodynamics.

Theoretical Nuclear Physics
Nucleon-nucleon correlation effects in the nuclear structure and nuclear reactions, exotic nuclei, group-theoretical methods in nuclear theory, complex models of deformed nuclei, symmetry and fine structure of nuclear spectra, structure and dynamics of manyfermion systems.

DEPARTMENT

High Energy and Astroparticle Physics

LABORATORIES:

High Energy Physics
Scientific investigations at the LHC collider at the European Laboratory for Particle Physics (CERN), Geneva, Switzerland with the experimental set up CMS. Participation in the collection of experimental data from the collision of two proton beams with energies of 0.9 TeV, 2.36 TeV and 7 TeV in the system of center of mass. Data processing permits to reopen all known up to now particles in the Standard model. The CNS experiment has started its scientific programme with heavy ions.

Particle and Astroparticle Physics
Elementary particles, astroparticle physics, data analyses, neural networks, artificial intelligence. Participation in the NA49 and ATLAS CERN experiments. Search of new astrophysical gamma sources with the MAGIC experiment. Participation in the design of the future international gamma astroparticle experiment CTA.

DEPARTMENT

Nuclear Physics

LABORATORIES:

Nuclear Spectroscopy
Experimental and theoretical investigation of the structure of atomic nuclei, nuclear safety, radioecology, natural radioactivity.

Nuclear Reactions
Nuclear reactions, nuclear structure, high-spin nuclear physics, lifetimes of excited nuclear states, nuclear electromagnetic transitions, accelerator physics and technology.

Semiconductor Detectors for Nuclear Radiation
Semiconductor detectors, nuclear electronics, electronic noise, resolving power and efficiency of spectrometry equipment, nuclear spectroscopy.

Positron Spectroscopy
Positron physics, positron, para and ortho-positronium, electron-positron interaction, annihilation, positron lifetime, Doppler broadening of annihilation gamma-line. Model simulations of atom cascades in fusion materials used for the first wall of the thermonuclear reactors ITER and DEMO, radiation defects, vacancies and nano-clusters.

DEPARTMENT
Neutron and Reactor Physics

LABORATORIES:

Neutron Data
Neutron data for innovative reactor technologies, resonance neutron cross- sections - measurements and analysis, resonance parameters.

Reactor Physics
Reactors WER and research reactor IRT, neutron physics and thermophysics analyses, nuclear safety of the reactor and nuclear fuel storage, neutron transport and reactor dosimetry, nuclear power plant decommissioning. Analyses on the research reactor IRT with a specialized channel for neutron therapy.

DEPARTMENT
Nuclear Energy

LABORATORY Nuclear Energy and Nuclear Safety
NPP safety analyses, nuclear reactors and installations, thermohydraulics analyses, emergency instructions, decommissioning, nuclear fuel phenomena modelling, nuclear fuel performance and thermomechanical analysis at operational steady-state, transient and hypothetic accident regimes, system aspects of energetic technologies, water chemistry and radiochemistry of WER reactors, corrosion processes in primary and secondary circuits

DEPARTMENT
Nuclear Methods

LABORATORIES:

Nuclear Electronics and Mdssbauer Spectroscopy
Nuclear devices, radiation detectors, high voltage power supplies, neutron moisture meters, low activity radiometers and spectrometers, magnetic nanomaterials, nuclear equipments and technologies.

Neutron and X-ray Investigations
Neutron and X-ray diffraction, small angle scattering and reflectomrtry, structure and magnetic order, texture and stress, magnetic domains, phase transitions, gamma radiation effects, nanoeffects, clusters, nanoparticles, structure analysis, short range atomic order, martensitic transformations, internal stress in construction materials.

DEPARTMENT

Radioecology and Environment

LABORATORY

Radioanalytical methods

Monitoring of liquid and aerosol samples generated from the activity of NPP „Kozloduy", reference sources, iodine emissions, iodine monitoring, activation detectors, determination of alpha and beta emitters in different matrixes, determination of ^{14}C and ^{3}H.

FACILITIES

Nuclear Scientific-Experimental and Education Centre with Research Reactor IRT

Nuclear base with research reactor IRT. Reconstruction of IRT 2000 into low power (200 kW) reactor with low enriched fuel. Usage of the reactor as a training and education center, channel for medical application of neutron capture therapy, isotope production for tracers in industry and medicine, neutron activation analysis.

Basic Environmental Observatory „MUSSALA"

Physics and astrophysics of cosmic rays, monitoring of global environmental changes, meteorological observations, measurement and spectroscopy of aerosols, control of long-range transfer of radionuclides, toxic elements and other pollutants, complex environmental monitoring.

Training Centre for Specialized Education for Work with Ionizing Radiation sources

Specialized education of persons, engaged with activities in the field of ionizing radiation. The training center issue certificates for professional qualification of nuclear energy use. INRNE is licensed for this activity since 2009 (License Ser. No. SO, Reg. No. 03164).

INRNE was founded in 1972 on the basis of the Institute of Physics of BAS (founded 1946).

Institute of Electrochemistry and Energy Systems (IEES)

1113 Sofia, Acad. G. Bonchev St., Bl. 10;
Tel. (+359 2) 872 25 45, Fax: (+359 2) 872 25 44
E-mail: cleps@bas.bg
URL: http://**www.bas.bg/cleps**

The main topics in the research of the Institute of Electrochemistry and Energy Systems are: fundamental electrochemical studies; research and development of electrochemical energy sources and information systems; electrochemical materials science; electrochemical methods, techniques and instrumentation; development and application of e-Science tools. Electrochemical research of the processes of crystallization during the electrodeposition of metals is in progress. A new type of gas-diffusion electrodes is developed using highly active non-platinum catalysts. Various types of metal-air (Zn-Air, Al-Air, Fe-Air, Mg-Air) cells and batteries are designed. Gama primary Zn-air cells and batteries with excellent exploita- tional characteristics are designed and are in production. The mechanism of the processes in lead-acid batteries is experimentally and theoretically clarified. The mechanism of the intercalation processes of Li-ions is investigated. New materials suitable for use as electrode materials in primary and secondary Li elements are synthesized. Research and development of electrochemical information systems is a new topic, which concerns: sensors for humidity and 0_2 in gases, biosensors for determination of glucose and lactate in biological fluids for medical application; biosensors for determination of phenols and alcohols in water solution and atmospheric air for ecological application. In accordance with the perspective of the hydrogen- based economy, active research in the field of hydrogen storage, fuel cells and metal-hydrides is under progress. An advanced method for differential analysis of electrochemical impedance is elaborated and disseminated. A new impedance-based technique for investigation of non-stationary electrochemical systems is developed. New multifunctional nano-sized materials are produced by originally developed technology.

TECHNOLOGIES

Production of zinc-air elements
Production of lead-acid accumulators
Production of electrode materials for lithium batteries
Nanoscaled materials production

EQUIPMENT

Thermo/analytical equipment X-ray diffractometer SEM/EDX • Ar- laser
BET surface analyzer, Hg-porosimeter Rb battery testing laboratories Laboratories for investigation of fuel cells

DEPARTMENTS

Electrochemistry of Lead-acid Batteries
Research on the processes on Pb electrodes in sulfuric acid; investigation of the processes during manufacture and exploatation of lead-acid batteres; of the reversible and irreversible processes taking place during the batteries exploitation. Investigation of the mechanisms of the closed oxygen cycle and the thermal deterioration of the batteries. Study of the influence of the different additives in the positive and negative plates. Development of new technologies and new materials for the production of lead-acid batteries

Electrocatalysis and Electrocrystallization
New high capacity metal hydride alloys for application in Ni/MH batteries and fuel cells. Studies of water electrolysis at increased temperatures, applying innovative membranes and catalysts. Metal electrocrystallization. Electrocrystallization of metals. Influence of the crystallographic structure on the form and on the spreading of monoatomic layers. Mechanism of atoms incorporation in the crystal lattice

Electrodes with catalysts from enzyme-oxidase and biosensors based on them. New type of enzyme/gas-diffusion electrodes and biosensors for glucose and lactate monitoring (for medical purposes) and biosensors for direct detection of phenol pollution in waters and air. Development of air gas-diffusion electrodes with high active non-platinum catalysts. Development and production of gama zinc-air cells with different applications and of ecologically safe Mg-air cells with salt electrolytes

Solid State Electrolytes
The department consists of two laboratories: „Amorphous Materials" (AM) and „Polymer Electrolyte Membrane Hydrogen Energy Conversion" (PEM- HEC). The AM laboratory studies non-crystalline oxide and chalcogenide materials and the application of these materials as solid electrolytes, fast detecting media for gas sensing and materials in far infrared optical devices. The PEMHEC laboratory studies hydrogen generation via electrochemical water splitting; development of electrocatalysts and membrane electrode assemblies and catalysts for electrochemical hydrogen generators, hydrogen fuel cells and bifunctional hydrogen energy converters operating with solid polymer membrane electrolyte; development of autonomous testing devices for screening and optimization. The main objective is to create research infrastructure and collect data base for fabrication of membrane electrode assemblies for electrochemical hydrogen energy conversion. The goal is the realization of a mini system demonstrating the complete „green" hydrogen energy conversion cycle.

Electrochemical Methods
A new method has been developed in the field of impedance spectroscopy „Differential impedance analysis", with increased sensitivity and ability to elucidate the investigated processes. In combination with the new method of differential coulomb spectroscopy and classical testing methods makes possible to investigate electrochemical energy sources. This approach is sucessfully applied to the development of innovative fuel cells and hydrogen energetics.

Lithium Systems Electrochemistry
Materials for rechargeable lithium storage with high specific capacity working at different voltage vs. lithium reference electrode and ensuring high energy density. Nanoscale composite materials based on metal-carbon and silicon-carbon as negative active material for Li-ion batteries. Lithium metal phosphates and mixed transition metals oxides as active materials for the positive electrode of rechargeable high-efficiency Li batteries. Carbon materials, obtained from waste bio-products for application in electrodes for batteries. Hybrid high efficiency systems for energy storage based on a new type of Li-ion batteries.

Nanoscaled Materials
Development of electrochemlcally-stable shape-anisotropic nanosized particles and their deposition on various oxide surfaces of electrode materials, as well as deposition of electrochemically active nanomaterials on carbon supports. Production of nanosized electrode materials for electrochemical power sources, nano-sized electrocatalysts. Characterization of pure materials and composites in the process of their storage and laboratory functional testing. Investigations of nanomaterials for innovative catalysts with application in membrane electrodes for hydrogen synthesis. Development of nanomaterials with biological activity in synthesis of electrochemically active nanotubes, which interact reversibly with lithium, as well as of biologically resistant nanomaterials with medical application.

Energy Efficiency
Efficient exploitation of second generation wind and solar energy sources (with energy accumulation); examination of the technological and normative approaches for increasing energy efficiency of transport systems; analysis of the scientific potential in the research field of energy resources and energy efficiency.

IEES was founded in 1967 on the basis of the department „Electrochemistry" at the Institute of Physical Chemistry at BAS.

Institute of Chemical Engineering (IChE)

1113 Sofia, Acad. G. Bonchev St., Bl. 103;
Tel. (+359 2) 870 42 49, Fax: (+359 2) 870 75 23
E-mail: ichemeng@bas.bg
URL : http://**www.bas.bg/iceng/index.html**

The Institute of Chemical Engineering is a chemical engineering and bioengineering science research centre. The mission of IChE is to contribute to the sustainable development of the country with its scientific methodology in the field of chemical technology and industrial biotechnologies.

Priorities:
Development of „green" and waste-free technologies for reduction of release of industrial wastes, their management and exclusion of hazardous waste to minimize their adverse impact on the environment. Development and improvement of processes, equipments and technologies for increasing the resource and energy efficiency of running and new enterprises.
Development of methods, facilities and technologies for replacement of non-renewable raw materials and fossil fuels by renewable ones, based on biomass and other renewable natural resources.

Training of qualified specialists.
The Institute has developed and industrially applied more than 20 new processes, equipment and systems with environmental or energy saving effects: contact economizers for utilization of heat from flue gases of heat power stations; technologies and apparatuses for removal of toxic contamination from gas fluxes; new concept for heterogeneous catalytic reactors; extraction technologies for removal and recovery of valuable toxic substances from waste waters and their further utilization. Nine industrial equipments for ethanol production and one for production of anhydrous ethanol are constructed and applied.

The liquid membrane method was developed for simultaneous extraction and concentration of valuable solutes or toxic substances from waste waters and natural sources. The studies in the field of biotechnology concern the kinetics of various fermentation and enzyme processes, practically applied for biological purification of waste waters, and in the pharmaceutical industry. New methods are developed for optimal energy use in batch chemical and biochemical processes, as well as for modelling of multi- component liquid-vapor equilibrium.

LABORATORIES:

Transfer Processes in Liquid Media
Extraction of metals and organic compounds In liquid-liquid and liquid- solid systems, separation of oil-in water emulsions, recovery of valuable substances from waste waters. Gas absorption using packed and plate columns; separation by distillation; heat utilization by direct or indirect heat transfer; mutual heat and mass transfer.

Chemical and Biochemical Reactors
Kinetics and transfer processes in heterogeneous chemical reactors, transfer processes in two- and three-phase catalytic reactors. Kinetics and transfer processes in bioreactors with free and immobilized biocatalysts. Biochemical processes for environment protection.

System Engineering
Analysis and synthesis of chemical technological systems aiming at optimizing their design and control; chemical engineering thermodynamics; nonlinear heat- and mass-transfer.

In 1973 the Central Laboratory of Theoretical Foundation of Chemical Engineering was founded. In 1986 it became the Institute of Chemical Engineering.

Central Laboratory of Solar Energy and New Energy Sources (CLSENES)

1784 Sofia, 72, Tsarigradsko Chose,
Tel. (+359 2) 877 84 48, Fax: (+359 2) 875 40 16
E-mail: solar@phys.bas.bg
URL: http://**www.senes.bas.bg**

The Central Laboratory of Solar Energy and New Energy Sources is the only scientific institution in Bulgaria carrying out fundamental and applied research in the field of renewable energy sources and in particular solar energy. One of the research areas is connected with devices and technology based on crystalline silicon. New technological processes and materials are developed with the aim to reduce the solar cells price and to increase their efficiency. The applied research is directed towards a broad programme for development and promotion of photovoltaic systems for autonomous power supply and grid-connected systems for decentralized electric power production. A methodology has been developed for estimating the amount of energy that would be produced from a specific area taking into account the equipment used. In the field of thin film photoelectric materials, studies are performed of thin film

silicon based materials, transparent conducting layers of doped ZnO films for TCOs and three- or four-element systems applicable to solar energy conversion like Cu(In,Ga)Se2, AlGaAs. Magnetron co-sputtering is used for the investigation of metal ions and of metal or semiconductor nanoparticles embedded in amorphous semiconductors and dielectrics. Carbon nanotubes and fullerenes are also under invesigation. Chemical technologies for metal oxide deposition obtained by sol-gel and chemical vapour deposition are successfully developed. A test laboratory has been built for evaluation of solar water collectors in real conditions and their certification according to the European standards. Research is carried out on some aspects of solar architecture mainly in the area of advanced materials and structures.

METHODS AND TECHNOLOGIES

Methods and technologies for material and element preparation applicable in photovoltaic and photo-thermal solar energy conversion: Chemical Vapour Deposition, vacuum evaporation, magnetron sputtering, close space sublimation, plasma deposition, chemical, sol-gel and electro-chemical deposition
Methods and technologies for material, element and structure characterization, and equipment for optical, electrical, photo-electrical, thermo-physical and thermo-dynamical measurements.

EQUIPMENT

solar test grounds for testing and evaluation of photovoltaic modules in real time
FUR spectrometer devices and systems for spectral, frequency, capacity and electrical measurements
photovoltaic devices and systems
spectrophotometer for the near UV, visible and near IR spectral regions
ellipsometer
magnetron sputtering equipment
electrical furnaces for high-temperature processes
photolithography installation

DEPARTMENTS

Solar Cells, Devices, PV Modules and Systems
Advanced technological processes and materials for highly efficient Si solar cells. Computer modelling of devices and systems. Design of photovoltaic modules and systems.

Photoelectric Materials
Deposition and investigation of thin films of amorphous and polycrystalline materials based on Si, C, ZnO, and others, for applications in solar cells, sensors, etc. Deposition and investigation of dielectric thin films containing dispersed metal nanoclusters for optical and electronic applications.

Photothermal Solar Energy Conversion
Chemical vapour deposition and sol-gel technologies for preparation of optical metal oxide coatings for solar energy conversion and energy control. Development of devices and systems for photo-thermal solar energy conversion.

CLCENES was founded in 1978 on the basis of two research sectors of the Institute of Solid State Physics

NANOSCIENCES, NEW MATERIALS AND TECHNOLOGIES

Institute of Solid State Physics „Acad. Georgi Nadjakov“ (ISSP)

1784 Sofia, 72, Tsarigradsko chose Blvd.,
Tel. (+359 2) 875 80 61, Fax: (+359 2) 975 36 32
URL: http:// **www.issp.bas.bg**

The mission of the Institute of Solid State Physics is: to acquire fundamental knowledge in the fields of condensed matter physics, optics, spectroscopy and laser physics; to apply this knowledge for the development of new materials, devices and analytical methods for micro- and nano-technologies. New interdisciplinary approaches of physics in biology, ecology, medicine, and archaeology are applied; the results obtained are transferred to the economy of Bulgaria. The main scientific and applied achievements of the Institute are in the field of condensed matter theory, phase transitions theory, superconductivity and superconducting materials, low-temperature physics, nanophysics, microelectronics, microacoustics, liquid crystal physics, soft and living matter physics, investigation of the structure and properties of crystals and amorphous materials, atom and plasma physics, nonlinear, integral and fiber optics, metal vapour lasers.

EQUIPMENT AND METHODS

Methods and equipment for carrying out of electron microscopy, elec- tronography, X-ray analysis, X-ray diffractometry investigations, for spectral ellipsometric measurements, spectroscopy from VUV to IR spectral regions, EPR spectrometry.
Equipment and know-how for single crystal growth from oxide materials for laser technology and photorefractive effect applications. Techniques and technology for thin layer deposition for microelectronic, optoelectronic and acoustoelectronic sensors.
Clean room.
Complex equipment for molecular beam epitaxy.
Equipment for synthesis and investigation of high temperature superconducting materials.
Equipment for polarization measurements in mesophases and polymer liquid crystals for display technologies.
Equipment for stroboscopic videomicroscopy and micromanipulation of lipid membranes.

Various laser systems: gas discharge metal vapour and solid state (ns and fs) lasers, oscillating in the UV, visible and IR spectral range, laser analysis and material processing, for application in nanotechnology, medicine, archaeology, ecology, etc.
High-tech experimental setup for laser cooling of atoms (“0.0001K). Physical Properties Measurement System produced by Quantum Design, USA for studies of electrical, magnetic and thermal properties of materials, surfaces and structures.
Scanning probe microscope (VEECO, Multimode, USA) for precise surface characterization at the nanoscale of morphology, electric, magnetic and other properties of surfaces.

DEPARTMENT
Theory

Theoretical Department
Theory of quantum liquids and crystals; nonlinear phenomena and solitons in condensed media, including optical pulses in nonlinear media and waveguides; macroscopic electrodynamics of deformable media with quasiparticles; theory of phase transitions and critical phenomena, finite-size scaling; theory of magnetism; theory of neural networks and application of statistical physics to biological problems.

Research Group on Collective Phenomena
Thermodynamics, statistical and quantum field theoretical methods; properties of phases, phase transitions, critical phenomena; correlations, coherence, low dimensional effects, applications for superconductors, superfluids, magnets, ferroelectrics, liquid crystals and other condensed media.

DEPARTMENT
Material Physics

LABORATORIES:

Electron-Phonon Interactions
Vibronic effects and effects of broken symmetry and low dimensionality in crystals; point defects and colour centers in solids; structure and dynamics of many-electron systems; mechanical stress in thin-layer structures; surface photo-charge effect.

Crystal Growth and Structural Methods
Technology, growth and characterization of oxide crystals of silenite and perovskite type - undoped, doped and co-doped; crystal growth and investigation of semiconductor crystals cadmium telluride, etc.; conventional and high resolution transmission electron microscopy for investigation of the real structure of single crystalline, polycrystalline and amorphous materials; X-ray analysis of the structure of crystals, layers and biological objects, Raman and IR spectroscopy.

Biocompatible Materials
Development of biocompatible materials for correction and recovery of tissue functions, imitation of natural processes for biomaterial formation, development and investigation of nano-structured coatings for bone implants.

DEPARTMENT
Nano-Physics

LABORATORIES:

Photoelectrical and Optical Phenomena in Wide Bandgap Semiconductors
Deposition and characterization of nanostructured thin films including amorphous and crystalline semiconductor materials, synthesis of chalcogenide glasses, preparation of amorphous chalcogenide thin films and study of the effect of various irradiations and thermal treatment on their structure related properties, preparation of AC electroluminescent structures for production of bright and stable alphanumeric displays.

Semiconductor Heterostructures
Structural, optical, mechanical and electrophysical properties of nanostructured oxide and nitride dielectric and semiconductor films and heterostructures; mechanical and electrophysical properties of amorphous silicon layers enriched with hydrogen; radiation defects in Si-based nano-sized heterostructures induced by RF plasma treatments, ion implantation and different kinds of irradiation.

DEPARTMENT
Micro- and Acoustoelectronics

LABORATORIES:

Physical Problems of Microelectronics
Physics and technology of metal-oxide-semiconductor structures (MOS capacitors, MOS and polysilicon transistors), thin dielectric, semiconductor, magnetic and metal layers for nano- and microelectronic systems; physics of the Si-dielectric interface microsystem; microelectronic silicon sensors technology, micromashining, microelectronic gas sensors, magnetotransis- tors, magnetoresistors, TFTs.

Acoustoelectronics
Excitation and propagation of acoustic waves in condensed matter; acoustic and thermodynamic properties of solids; materials for acoustoelectronics; acoustoelectronic elements and devices in communications; acoustoelec- tronic sensors; calibration and certification of elements and devices for temperature measurements.

DEPARTMENT
Low Temperature Physics

LABORATORIES:

Low Temperature Physics
Investigation of condensed phases at low temperatures, critical phenomena in finite-size systems, magnetic interactions in metal and oxide superconductors, magnetotransport properties of manganese perovskites, synthesis and transport properties of new High-Temperature Superconductors (HTS), superconductivity and thermal properties of HTS.

Enviromental Physics
Application of the methods of multivariate statistics for the classification, modelling and interpretation of various eco-physical systems.
Supporting Unit „Cryogenic Technology"
Physics of heat transport and mass transport in gases, liquids and solids; cryogenic technologies; liquefaction of gases.

DEPARTMENT
Physical Optics and Optical Methods

LABORATORY
Optics and Spectroscopy

Thin layer and surface integrated optics, planar waveguides; optical fibres, in-fibre Bragg diffraction gratings; holographic diffraction gratings; micro- and nanophotonics; quantum optics; optics, spectroscopy and elecrooptics of thermotropic liquid crystals; multi-photon processes, nonlinear optics; linear and nonlinear laser spectroscopy of complex organic molecules including biomolecules; theoretical methods in molecular physics

DEPARTMENT
Soft Matter Physics

LABORATORIES:

Liquid Crystals
Physical properties of thermotropic and lyotropic liquid crystals and polymer liquid crystals, elastic and electrical properties of model lipid membranes and biomembranes

Biomolecular Layers
Bilayer lipid membranes and biomembranes, ultrathin molecular layers on solid substrates, smectic and lyotropic liquid crystal systems, nanostructured liquid crystals, physics of liquid crystal surface.

DEPARTMENT

Laser, Atomic, Molecular and Plasma Physics

LABORATORIES:

Atomic Spectroscopy
Atomic spectra - structure and properties; atomic constants of excited states - radiative lifetimes, transition probabilities, etc.; atomic interactions at thermal energies; processes in low temperature plasma of CW and pulse gas discharge, including in hollow cathode lasers; optogalvanic spectroscopy and application of the atomic spectroscopy for analytic purposes; laser induced plasma application in atomic spectroscopy; laser cooling of atoms and manipulation.

Metal Vapour Lasers
CW and pulsed UV, VIS and IR metal vapour lasers, high power pulsed copper vapour lasers with high efficiency and high beam quality, investigation of various gas discharges for obtaining inverse population on atomic and ion transitions; investigation of the processes in gas discharge plasma; investigation of linear and nonlinear optical properties of new materials; laser applications for fine material processing, in nanotechnologies, laser spectroscopy, medicine, measurements, navigation, restoration and conservation of cultural heritage and others.

Research Centre for Physical Properties of Materials, Surfaces and Structures
Scanning probe microscope (AFM) and unique in Bulgaria Physical Properties Measurement System (PPMS) for high level investigations.

Section Innovation

Section Education

SUPPORTING UNITS

Molecular Beam Epitaxy
Epitaxial growth and investigations of multicomponent semiconductor heterostructures.

Optical Workshop
Manufacturing of lenses, prisms, laser mirrors and various optical elements, optical treatment of crystals, etc.

Glass Blowing Workshop
Manufacturing of laser tubes and other elements and details from glass.

Museum on History of Physics in Bulgaria
Created as a museum of academician Georgi Nadjakov in 1981, today the Museum keeps old instruments, books, documents and photographs of leading Bulgarian physicists

The ISSP was founded in 1972 on the basis of the Institute of Physics of BAS (founded 1946).

Institute of Electronics „Acad. Emil Djakov“ (IE)

1784 Sofia, 72, Tsarigradsko chose Blvd.,
Tel. (+359 2) 979 58 87, Fax: (+359 2) 975 32 01
E-mail: die@ie.bas.bg
URL: http://**www.ie-bas.dir.bg**

The Institute of Electronics carries out research and training of specialists in the fields of physical electronics, photonics and quantum electronics and radiophysics. The investigations In physical electronics are focused on the generation and control of electron and Ion beams and their Interaction with matter. Novel techniques, theoretical modelling, experimental and Industrial 69 equipment are developed for surface modification, thin film deposition and characterization, welding and melting of metals by Intense electron beams in vacuum. The physical basis of the technology of fabrication of nanodimensional structures using electron and ion beams is studied. Computer simulation and experimental investigations are carried out on electron and ion lithography of submicron and nanoelectronic structures. The possibilities are explored of creating nanomaterials and nanoelectronic elements utilizing superconducting carbon and polymer films. Another area of research concerns fundamental properties of gases and plasma of rare gases and metal vapors; restoring electron-molecule interaction cross-sections; modelling of binary interactions in molecular gases for industry, ecology and spectroscopy. Arc plasma and arc plasma torches are studied in view of diagnostics and applications, such as plasma-assisted formation of thin films and coatings, and realization of plasma-chemical processes.
The research in photonics and quantum electronics includes: experimental and theoretical studies of the interaction of pulsed and ultra short laser radiation with matter; new technologies, based on the near field optics, plasmonics and nanostructuring; laser deposition and processing of active and passive optical and magnetic films; electromagnetically induced transparency and absorption in alkali atoms, with application in metrology and magnetometry; investigations and development of complex laser systems for modification and analysis of semiconducting and HTSC materials; theoretical and experimental studies of nonlinear optical phenomena; biomedical photonics.
The research in radiophysics is focused on studying the interaction of optical and microwaves; laser remote sounding and monitoring of the atmosphere, microwave radiometric sensing of the soil moisture; detection methods, amplification and signal processing techniques for extraction and interpretation of information; design of microwave devices for radar and communication system applications; nonlinear processes in optical communication media.
The first Bulgarian laser, LIDAR, plasma torch, ultrahigh vacuum pump, micro- channel electron-optical converter, parametric microwave amplifier, Josephson junctions and SQUID, portable microwave moisture meter, magnetometer, installation for electron lithography, electron beam melting and refining, electron beam welding were successfully developed at the Institute.

METHODS

Preparation and characterization of thin films, for fabrication of HTSC/ ferroelectric multilayer structures, modification of YBCO structures for SQUID, for low-temperature growth of highly-textured thin films. Technologies for plasma deposition of wear-resistant, corrosion-resistant, hard and low-friction-coefficient coatings.
Technologies for plasma-chemical synthesis of ultra-dispersed powders. Technologies for electron-beam welding, melting and refining of metals. Controlled recrystallization of polycrystalline oxide and semiconductor materials.
Determination of elementary characteristics of electrons and molecules by simultaneous processing of experimental data on transient and steady state phenomena.
Spectral selection and spatial control of light beams.
Line narrowing of single-mode infrared diode lasers.
Generation of nanosecond and sub-nanosecond lasers pulses with controlled shape and duration.
Temporal control of laser oscillations.
Spectral processing of lidar data in view of restoring the wind-velocity profile.
Lidar mapping of atmospheric pollution over large urban and industrial areas.
Restoration of the atmospheric extinction and calibration of the lidar output data in terms of the aerosol mass concentration.
Doppler measurements of the wind velocity using low-frequency-stability laser sources
Measurement of the vector velocity of inhomogeneous atmospheric formations by processing of 2D images.
Remote Raman scattering measurements of atmospheric temperature and humidity.
Calculation and optimization of the parameters of low-noise MW transistor amplifiers and receivers
Determination of soil and leaf moisture content using MW radiometric data.
Laser processing of different materials.
High resolution analysis of surface topology Spectroscopy of biological samples

EQUIPMENT AND FACILITIES

Complex experimental vacuum systems for the electron beam vapour deposition of thin films
100 kW equipment for plasma spaying
Experimental set-up for gas discharge plasma diagnostics
Vacuum installations for thin film deposition by magnetron sputtering
and plasma enhanced chemical vapour deposition.
Electron beam welding and surface treatment plant; equipment for electron-beam evaporation and physical vapour deposition of thin films; equipment for electron-beam melting and refining of metals and alloys DC and RF magnetron sputtering systems
Electrical and microwave characterization (critical temperature and critical current density, surface resistance) of superconducting thin films and superconductor/ferromagnetic thin film structures Photolithography equipment

System for pulsed laser deposition and modification of thin films Photoluminescent measurements M-line system for optical film characterization Gas-sensing measurements
Experimental setup for pumping, self-injection locking, selection and tuning of lasers
A family of laser and LED computerized systems for diagnostics, surgery and therapy
High-stability digitally-controlled diode laser systems Digitally controlled all-optical automatic magnetometers High resolution CCD camera aerosol CuBr / photon counting troposphere & stratosphere lidar 3 wavelength Nd:YAG Raman lidar Aerosol Nd:YAG polarization lidar DIAL Laser Diode lidar Long-range lidar measurements Spatially resolved optical measurements in turbid media IR optical and microwave radiometers in L-, C- and X- bands Microwave moisture meter
Microwave measurements of permittivity and permeability, and ferromagnetic resonance line-width
Spin-spray plating of magnetic and HTSC layers and composites Technological system for obtaining ferric oxide and hybrid nanoparticles, based on co-precipitation and micro-emulsion technologies Multifunctional systems for resonance registration and processing

LABORATORIES:

Plasma Physics and Engineering
Basic processes In plasma and gas; Edge plasma diagnostics with Langmuir probe (tokomak COMPASS); Development and computer modelling of high power gyrations for electron cyclotron resonance heating of magnetically confined plasma and high frequency gyrations for fundamental scientific investigations and new technical applications; investigations of nanocomposite materials and structures.

Physical Problems of Ion Technologies
Ion-assisted processes for thin film deposition; Ion beam modification of high temperature superconducting layers; SQUIDs; Carbon based electronics; Selective solar absorbers; Hard and anti-corrosion coatings; Nanostructured materials.

Physical Problems of Electron-Beam Technologies
Physics of charged particles beams; Theoretical and experimental study of electron and ion propagation in matter; Modelling of processes in sub-micron and nanosized electron and ion beam lithography; Nanosized electron components; Electron beam film deposition, welding, melting and refining of metals and alloys.

Superconductivity and Cryoelectronics
Fabrication of thin films based structures of oxide materials - high temperature superconductors, magnetic materials, multi-ferroelectrics, and dielectrics; Physical characterization and applications in cryoelectronics.

Micro and Nanophotonics
Experimental and theoretical investigations of the interaction of pulsed and ultrashort pulse laser radiation with matter; Plasmonics; Nanostructuring; Pulsed laser deposition and modification of active and passive optical and magnetic films; Sensors; Methods for metal nanoparticles and nanostructure fabrication and optical properties characterization.

Laser Systems
Coherent spectroscopy of alkali metal vapour, including vapour in nanosized container; Optical magnetometers, based on electromagnetically Induced transparency with application in metrology, archaeology, material characterization, and magnetic cardiography. Miniaturization of optical sensors and devices with application in photonics.

Fibre and Non-Linear Optics
Femtosecond laser pulses propagation in sub-diffraction regime; Collapse arrest and nonlinear waveguide propagation regime of ultrashort laser pulses in atmosphere; Optical vortex structures; Solitons in optical fibers; Parametrical processes in fibers and isotropic media.

Laser Radars
Lidar monitoring of tropo- and stratosphere; Regular lidar measurements in the frame of EARLINET; Earth lidar measurements for NASA and ESA; Lidar measurements of planetary boundary layer; Lidar signal processing; Lidar deconvolution methods for improvement of the resolution of the lidar systems for plasma diagnostics; Lidar ecology measurements of „hot spots" in Bulgaria; Optical radiometry of rock samples.

Microwave Magnetics
Magnetic materials and their interaction with DC and AC electromagnetic fields; Fabrication of bulk ferroxides, nanosized magnetic powders and thin films; Microwave absorbers and nanostructured ferrospinels; Microwave materials (ferrites, dielectrics, composites, and high temperature superconductors) characterization and application in the passive microwave devices; Nanostructured bulk materials, multilayer structures and coatings for microwave absorbers; Methods for magneto-optical analyses of nanosized materials; Nanostructured hybrid particles, composites and ferrofluids for biomedical applications.

Microwave Physics and Technologies
Generation, amplification, conversion, and propagation, including in natural conditions, of microwaves; development of non-linear models for design and optimization of MW systems; scattering of waves from rough surfaces; passive and active MW remote sensing; complex and chaotic systems.

Physical Technologies - Sliven
Metal nitride thin film deposition and characterization of their physical and mechanical properties; Deposition of different coatings on glass; Theoretical description of the interaction kinetics in solid phase of thin films; Surface properties of steels after electro-physical treatment.

Biophotonics National Centre of Biomedical Photonics
Processes of interaction of laser radiation and light with biological tissue at cellular, organ and system level; Development and construction of laser and optical device prototypes with application in the field of medical diagnostics and treatment; Coherent and nonlinear spectroscopy of atomic systems in gas phase and applications of nonlinear resonances in metrology and medicine; Development of new approaches for fabrication of lasers with specific operation characteristics and their application in ecology and communications.

IE was founded in 1962 on the basis of the Technical Physics Department of the Institute of Physics of BAS

Institute of Optical Materials and Technologies

„Acad. Jordan Malinovski“ (IOMT)

1113Sofia, Acad. G. Bonchev St., Bl. 109,
Tel./Fax: (+359 2) 872 00 73
E-mail: cif@cif.bas.bg
URL: **www.optics.bas.bg, www.clf.bas.bg**

The research goals of the Institute of Optical Materials and Technologies are to study photo-induced processes in micro- and nano-sized layers and structures, development of high-technology novel materials and methods for optical applications in flexible transparent electronics, novel materials and registration systems for ecology, biomedicine, food industry, non-destructive testing and cultural heritage protection. Examination of the interaction of solid materials with different types of radiation as microwave and X-ray radiation, electron and ion-beam radiation, light and laser radiation in the UV and the visible. Innovative products for industrial application in the field of sensorics, organic optoelectronics, renewable energy sources, biomedical engineering are under development. Research is carried out on optical recording of information, diffraction optics and optical metrology. Media for permanent and reversible holographic recording on the basis of silver-halide emulsions, azo- benzene containing polymers, photorefractive crystals and polymer dispersed liquid crystals are also subjects of research. Synthesis of holographic optical elements for precise metrology and multi-color holographic recording are also among the research topics. Theoretical analysis of optical elements and structures is actively conducted, including for characterization of nano-sized objects. Multi-functional systems for precise macro/micro measurement of relief, deformations, mechanical stress, refraction index are also being constructed.

EQUIPMENT

Scanning electron microscope and transmission electron microscope • X-ray laboratory
Equipment for Auger spectroscopy Equipment for spectro-photometric analysis Equipment for vacuum deposition of thin films
Laboratory for photolithography
Chemical laboratories for production of silver-halide light-sensitive materials and photopolymers Laboratory for digital and multi-color holography Laboratory for holographic interferometry

DEPARTMENTS

Nanostructured Materials and Technologies
Organic light-emitting diodes and photo-voltaic cells on the basis of multilayer organic/inorganic stacks. Methods for vacuum and layer deposition of multi-layer systems of organic materials like metal phtalocyanines, new synthesized fluorescent, phosphorescent and other low molecular weight polymer compounds as emitters and dopants for OLEDs. Methods for characterization of light-emitting diodes and photovoltaic cells. Gas and biosensors based on nano-structured layers from metal oxides as ZnO, TiO_2 and methods for formation of nano-structured layers (nano-particles, nanofibres, nano-bands, nano-tubes) such as plasma-stimulated chemical vapour deposition from precursors, high-temperature vapour deposition, spray pyrolysis, electro fiber for

mation, laser modification of the deposited layers. Interaction of nano-structured oxide layers with different gases and pathogenic bacteria and methods for characterization of their sensor properties for application in ecology and healthcare.

Optical Materials
Materials and structures for the photonics and nonlinear optics, synthesis and deposition of thin layers of chalcogenide glasses and investigation of their optical (linear and nonlinear), mechanical and thermal properties, investigation of photo- and thermo-induced changes in their physical properties, holographic recording and reading of information data in nano-sized layers, multi-beam interference lithography for formation of periodical structures, development of multi-directional reflectors for hollow fibers and filters. Planar waveguides on the basis of polymer/chalcogenide glass, methods for application of evanescent light waves for nano-photonics, nano-sized holographic methods for document security and super-resolution holographic optical elements. Research on optical resonances, including thorough examination of surface plasmons and plasmon-polariton resonances and recording and investigation of metalized relief diffraction gratings. Development of new materials and structures for active and passive devices.

Holography and Optical Metrology
Nano-sized light-sensitive materials for holographic recording - synthesis of monochrome and panchromatic emulsions on the basis of silver-halide and dichromated gelatin, recording of holographic optical elements, color art holograms and holographic illustrations on a flexible substrate, improvement of reconstruction quality of color holograms with diode lasers, outdoor holographic recording with portable holographic set-ups, creation of holograms and holographic exhibitions of museum artifacts for cultural heritage protection. Digital synthesis and reconstruction of holograms, development of portable systems for analog and digital holographic recording in static and dynamic operation mode and of coherent/incoherent hybrid systems with optical and digital processing of data for distant profilometry, 3D visualization with spatial-light modulators, feature recognition, multi-functional digital holographic microscopy, bio-speckle analysis, photoelastic measurement of mechanical parameters of composite materials. Development of specialized software for modelling the systems operation, testing of algorithms for relevant information retrieval and digital processing of experimental data.

IOMT was founded in 2010 through merging of the Central Laboratory of Optical Storage and Processing of Information (founded 1975) and the Central Laboratory of Photoprocesses (founded 1967).

Institute of Mineralogy and Crystallography „Acad. Ivan Kostov“ (IMC)

1113Sofia, Acad. G. Bonchev St., Bl. 107;
Tel. (+359 2) 870 01 61, Fax: (+359 2) 979 70 56
E-mail: mincryst@interbgc.com
URL: http://**www.clmc.bas.bg**

The Institute of Mineralogy and Crystallography is a leading scientific institution in Bulgaria in the field of mineralogy, crystallography and mineral resources. The mission of IMC is to contribute to the sustainable development of the society and to enlarging human knowledge in the fields of mineralogy and crystallography by multidisciplinary research of natural, technogenic and experimentally modelled mineral systems and synthesized new materials. The activitiy include: basic studies and applied research, consulting, expertise, service and analytic activities and training of highly qualified specialists, investigation and modelling of natural and technogenic mineral systems.

Priorities:

Understanding the Earth: investigation of minerals and mineral systems aiming at determination of their composition, structure, properties, associations, processes of formation and alteration; development of genetic models and criteria for prognosis, exploration of mineral deposits.
New Materials and Technologies: growing, synthesis and characterization of single and polycrystalline materials; modification of minerals and materials improving their sorption, catalytic and ion-exchange properties. Environmental Protection: investigation of important for environmental protection natural and technogenic mineral systems.
Nature and Natural Resources of Bulgaria: investigation, analysis, and prognosis of mineral resources of Bulgaria aiming at their effective and environmentally friendly utilization; studying, preservation and collecting of the mineral diversity of Bulgaria through supporting the „National Mineralogical Database", the „Heavy Minerals Map of Bulgaria", and a basic academic collection „Mineral Diversity of Bulgaria".
IMC is the domicile and scientific center of the Bulgarian Mineralogical Society and the Bulgarian Society of Crystallography

METHODS AND TECHNOLOGIES

Methods for precise phase identification and detailed study of the structure, composition and properties of minerals and materials.
Equipment, methods and technologies for the growth of optical and laser-grade single crystals, synthesis of microporous and nanosized materials, as well as for mineral modification aiming at improving their sorption and catalytic parameters.

EQUIPMENT

Laboratory of Electron Microscopy: 3 scanning electron microscopes - SEM EVO LS25 - CARL Zeiss SMT; transmission electron microscope Philips EM 420T with EDAX 9100/70.
Laboratory of X-Ray Diffraction Analysis: 2 single crystal X-ray diffractometers SuperNova; 2 powder X-ray diffractometers Bruker D2 Phaser and DRON 3M; specialized data processing software, full ICDD database and the structure databases ICSD, CSD and PDB.
Laboratory of Thermochemistry: 2 thermochemical complexes - SETA- RAM SETSYS Evolution (up to 2400°C) and Stanton Redcroft (up to 1500°C).
Laboratory of Spectroscopy: Bruker FT-IR spectrometer Tensor 37 with infrared microscope Hyperion 2000 and Varian UV-VIS spectrophotometer CARY-100 SCAN.
Laboratory of Experimental Mineralogy and Crystal Growth: equipment for low temperature hydrothermal synthesis, crystal growth and synthesis of ceramic and polycrystalline composites through hot pressing (Crystallox).
Chemical Laboratory AAS Perkin-Elmer 3030.
Laboratories of optical microscopy and of samples and preparations.

DEPARTMENTS

Topographic Mineralogy
Mineral objects formed in natural gradient systems aiming at the development of genetic mineral-forming models. Phase composition, characteristics and distribution of the components in technogenic systems, formed in utilization of mineral raw materials, as well as their impact on the environment.

Main research objects: magmatic and metamorphic rocks; fluorite and barite deposits; sedimentary exhalative polymetallic deposits; metalliferous sediments from ocean rift zones; coals and products of their combustion; waste products from power engineering, metallurgy and ore dressing; platinum-group minerals; heavy minerals concentrates; gold artifacts from different historical ages.

Experimental Mineralogy and Crystallography
Synthesis and crystallization of minerals and materials in model systems. Investigation of the products and processes of their formation. Experimental modelling of natural processes in gradient systems. Main research objects: microporous materials, natural zeolites, tungsten minerals, bentonites, phosphorites, sorbents based on clays and zeolites, titanium and zirconium silicates, basaltic glasses, catalysts, optical and laser-grade single crystals.

Structural Crystallography
Determination of the crystal structure, phase and chemical composition and properties of minerals, single crystals, crystalline and polycrystalline materials. Synthesis of new chemical compounds with particular structures and properties. Completing crystallographic and spectroscopic databases for minerals and materials. Main research objects: optical crystals and glasses, new crystalline materials, Nd- and Y-containing alumoborates, zeolite type materials and thin films.

Service Laboratory Department
Methodical support, consulting, expertise, and analytical service activities by means of electron microscope, X-ray diffraction, thermoanalytical and spectroscopic complexes.

„Acad. A. Balevski“ Institute of Metal Science, Equipment and Technologies with Centre for Hydro-and Aerodynamics (IMSET-CHA)

1574 Sofia, 67, Shipchenski prohod;
Tel. (+359 2) 46 26 200, Fax: (+359 2) 46 26 300
URL: http://www.ims.bas.bg

The Institute of Metal Science, Equipment, and Technologies with Centre for Hydro- and Aerodynamics carries out fundamental and applied research and training in the field of: metal science, heat treatment, casting, crystallization, structure and properties of metals, alloys and composites and nanomaterials, plasticity modelling, destruction of materials, functionality and reliability of construction, ship hydrodynamics, aerodynamics, water transport, ocean and coastal engineering, marine and river disasters and crises, national security and defense. Substantial part of the Institute's activity is focused on designing and production of devices and systems that ensure national security and defense. The output is compatible with the NATO requirements. The Institute creates original equipment, new materials, facilities, and technologies protected by patents.

The Institute has developed original machines, new materials and equipment with patent protection: 53 technologies evaluated in accordance with the Technological Readiness Levels used by NASA and by the European Organisations for Research and Development. A system for quality control of research and applied science activities for civilian (ISO 9001:2008) and military (AQAP 2110) service is introduced.
The main priorities in the activities are:
Study of the behavior of newly created metal alloys under conditions of static, dynamic and varying load.
Development of methods for assessing the remaining resource of hazardous facilities.
Creation of new high-tech equipment and protective.
Creation of new nano- and special materials, composites and technologies for their production.
Participation in new energy projects.
Creating innovative products and technologies in the field of metal science, engineering, shipbuilding and defense industry.
Hydro and aerodynamic design optimization of vehicles, drilling platforms, simulation and modelling research on the qualities of ships. Identification of hydrodynamic and aerodynamic efficiency of renewable energy sources.
Study of hydrodynamic characteristics of high-speed warships and means to repel terrorist attacks in the Black Sea.
Study of sea and river accidents and floods.
Scientific and applied research on the processes in welding of metals and alloys.
Study of the impact of production processes and processing methods on the characteristics and structure of materials.

TECHNOLOGIES, SYSTEMS AND DEVICES, EQUIPMENT

gas counter-pressure casting of metals and alloys, foam thermoplastics, etc.
diffusion welding in vacuum of different combinations of materials, welding of metallic with non-metal materials.
obtaining of macrodispersive ceramic-polymer composites resistant to high speed influences
laboratory and semi-industrial technology and equipment for obtaining high nitrogen steels and alloys.
production of high-strength martensite-ferrite stainless steel for use in aggressive environment.
technologies and magneto-hydrodynamic apparatus JETMAG® for welding of the coil to the collector in electrical machines, technology for coating of carbon glass on satellite equipment sensors, technologies in Security and Defense
computerized systems and programs for modelling, simulation and control of technological processes
deep pool (200 m x 16 m x 6.5 m) equipped with a towing cart with a maximum speed of 6 m / sec, wavemaker.
shallow pool (200 m x 16 m x (0 ч 1.5) m) equipped with a towing cart with a maximum speed of 6 m / sec
maneuvering and seakeeping basin (60 m x 40 m x 2.5 m) ultrasound
tracing system, wavemaker.
wave pool for coastal hydrodynamic studies
cavitation tube with two measuring sections (the first - 0.5 m x 0.5 m with a flow rate of up to 14 m/s, minimum cavitation number 0.2 and the second - 1.4 m 0.7 m with a maximum flow rate up to 4.5 m/s) equipped with 6-component balance for measuring forces and moments subsonic wind tunnel with working section 0.5 m x 0.8 m and a maximum flow rate of up to 66 m/sec.

software for CFD analysis and analysis of the hydrodynamic characteristics of ships and marine equipment
professional software packages: HECSALV - calculation of hydrostatics, stability and overall strength of the ship, for resolving emergency and rescue planning, MORA - calculating the dynamic characteristics of floating and moored marine engineering facilities numerical systems for hydrodynamic modelling of tasks on environmental protection: SWAN - distribution of wind waves in the marine coastal zone, MIKE 21 - modelling of waves, currents and sediments in rivers, estuaries, coastal bays and seas, MIKE FLOOD-simulation floods in 1D and 2D mode
system for conceptual design of the ship - NAPA a package of programs - Mantis, Terra Tools, Vaps for generating synthetic three-dimensional picture of the navigation environment for modelling the dynamics and control of ship
computer simulations of the dynamics of marine sites in the real conditions of navigation
CAD/CAM procedures for designing and manufacturing of complex three-dimensional surfaces.

DEPARTMENTS

Metal Science
Development of the internationally acknowledged and used method for gas counter-pressure casting. Study on squeeze casting process of metals and alloys and its application for obtaining industrial composite materials which improve the aluminum castings characteristics. Explorations and development of processes of casting under low and high pressure, centrifugal and die-casting in metal and combined moulds. New methods and equipment for observation and control of casting processes. Creating new Al- and Fe- based alloys and analysis of their properties. Technologies for obtaining quality products of Al- and Fe-alloys and composites with high mechanical and operational characteristics.

Technologies and Equipment for Special Steels and Alloys
Casting properties of alloys of ferrous metals; mathematical modelling, simulation and optimization of the processes of casting. Research on the problems of metallurgy under pressure; the processes of interaction of the metal-gas system taking place in an inert atmosphere, in gas mixtures or in vacuum; study the solubility of nitrogen in liquid and solid state and creating and testing of monolithic and powder metalurgical steels and alloys. Development of models for optimal control of thermal and hydrodynamic processes during cooling of castings in metal molds, as a system with distributed parameters. Equipment and know-how for the needs of metallurgy under pressure.

Technologies and Equipment for Casting of Metals and Alloys
Special and conventional casting technologies. Studying the relationship between structure, properties and technologic parameters during different casting processes. Methods for casting and the relevant eqipment for their realization. Gas counter-pressure casting method. The process of squeeze casting of metals and alloys and its application for manufacturing of industrial composite materials, improving the properties of aluminum alloys castings. Low- and high-pressure casting processes, centrifugal and die casting in metallic and combined moulds. Novel methods and equipment for maintenance and control of the casting processes; the properties of aluminum- and iron-based alloys. Technologies for high-quality aluminum and iron alloys and composite materials of improved mechanical and operational properties, for replacement of parts manufactured by means of other methods, e.g. forging, stamping and welding.

Technologies and Equipment for Non-Metallic Materials
Compounds for ceramic, glass, petrurgic, composite, binding materials, coatings and their products, technologies and equipment. High-temperature processes and systems for their synthesis and research on their physicochemical and mechanical parameters. Ballistic corundum ceramics and protection corundum based macro-disperse modules against high-energy kinetic impacts.

Protection Technologies and Systems
Critical infrastructure: influence of the methods for manufacture and processing on the structure formation and properties of materials; influence of the characteristics of materials on their behaviour under static, dynamic and varying load; stressed-deformation state of the materials; processes of fracture of materials in different conditions and types of loading; neutron induced degradation processes in the metal of WWER type RPVs. Technologies and systems for defense on land, air and water; technologies for enhancing the strength and wear-resistance of the entire structure of defense products and their operational improvement in extreme environmental conditions. Technologies for: improvement of the parameters of ammunitions of any type, increasing the penetration ability of their metallic cores; improvement in the protection abilities of light and heavy armor vehicles; technologies for non-lethal countermeasures; stealth technologies; anti-ballistic protection of helmets and protection vests, technologies for improving the protection of helicopters against RPG. High-tech products and systems for defense and security of critical infrastructure and counteraction against terrorist threats - complex technologies for protection of coastal area and harbor infrastructure against terrorist threats; technology for combat against remotely activated explosive devices; protection against systems for monitoring and interception; protection against unwanted communications; electromagnetic technology using laser spectroscopy with dashed lines and creating of a dynamic system for detecting explosive devices; technology for design and testing of composite materials to increase the internal resistance of premises against the effects of explosions.

Specialized Sensors and Devices
High-tech sensors based on passive transducers through variation of their physical parameters. Programs for scientific-technical and ecological development of the country. Modern innovative products with application in industry, transport, energetics, ecology and security. Preparation of design and technical documentation, making models and testing of prototypes in the field of sensor devices. R&D of sensors and devices for incorporation in systems for national security of EU- and NATO-member countries against threats on land, sea and air.

Centre for Hydro- and Aerodynamics - Varna
Research and training in the field of the ship hydrodynamics, aerodynamics, water transport, ocean and coastal engineering, crises and accidents at sea and on inland waterways, renewable energy sources, national security and defence; Hydro- and aerodynamic design optimization of sea/river transport vehicles, drilling platforms, engineering structures for ocean resources utilization. Simulation investigations of ship parameters in operational conditions through CFD methods and simulation systems. Research of risk phenomena and incidents of national importance - floods in the Bulgarian part of the Danube river, crashes/disasters of ships at sea and rivers; development and implementation of ship Emergency Response Systems (ERS) for reaction in emergency situations. Research of the efficiency of the sea/river transport, including development and implementation of intermodal transport schemes along the Rhein-Main-Danube water route, and building of a simulator for training in navigation of pushed barges trains on the European inner water routes. Model investigations of the hydro- and aerodynamic effectiveness of engineering structures for obtaining energy from renewable sources. Research of the risk factors in the ship navigation; development and implementation of systems for fuel saving for ship navigation in conditions of waves/winds, aerodynamic investigations of the noise and exhaust gases, generated by transport vehicles; air streamlining of buildings, structures and facilities. Design and investigations of means for adverting terrorist actions in Bulgarian waters; cooperative investigations of the hydrodynamic parameters of specialized navy ships at navigation in extreme conditions - in cooperation with Naval forces of NATO members

Ship Hydrodynamics and Aerodynamics Department
Numerical methods in the ship hydrodynamics. Numerical and experimental studies of ship resistance, flow and powering performance. Hydrodynamic assessment and optimization of ship hull form. Hydrodynamic design of ships and ship propulsors. Prediction of full-scale powering performance and attainable speed. Studies of propeller cavitation. Water transport efficiency analysis. Computer simulation of waterborne vessels dynamics in real navigation conditions. Numerical and experimental investigations on maneuverability and steering of surface and underwater vehicles. Automation of the model investigations of the water transport vehicles dynamics in experimental basin. Experimental and numerical investigations of the aerodynamics of ships, sea objects, industrial apparatuses, facilities and installations.

Ocean Engineering, Hydrotechnics and Marine Energy Renewable Resources
Dynamics of ships and marine structures for prediction of their behaviour in real operation conditions. Investigations of the static and dynamic stability of floating bodies. Passive and active positioning of floating structures. Modelling and simulation of marine operations for ensuring safety and optimal control. Physical and numerical modelling of the influence of waves, littoral currents, seabed sediments and coastal engineering structures. Assessment of the environmental impact of the engineering structures in the coastal zone. Prediction of the consequences from accidents and natural disasters on the coastal zone.

Centre of Excellence „Anti-Terrorist Intelligent Systems“
Providing adequate participation in: national programs and projects for defence against terrorism; NATO Defence Against Terrorism program; implementation of the requirements of the European Strategy for defence against terrorism; the initiatives of the international network of centers of excellence in the field of anti- terrorism. Training of operative and technical personnel at a national level and of specialists participating in NATO missions.

Centre for Welding
Examination and testing of the weldability of different materials (steels, plastics, etc.). Examination and testing of welding materials and welded joints. Investigation and measurement of temporary and residual stresses in welded and other constructions. Reduction and redistribution of the residual welding stresses. Development and approval of welding technologies and procedures. Development of technologies and equipment for special welding methods. Simulation and numerical modelling of welding processes.

Testing and analysis
The laboratories „Mechanical testing“, „Analysical chemistry“, „Spectral analysis“, „Metallography“, „Scanning electron microscopy and micro-analysis“, „Transmission electron microscopy“, „Auger electron microscopy“, „X-ray structure analysis“, „Metal corrosion“, „Non-destructive testing“ are merged into „Laboratory for material analysis and testing of materials and calibration of measuring devices“, which has a certificate for accreditation in compliance with the requirements of the standard BDS EN ISO/IEC 17025:2001

Institute of General and Inorganic Chemistry (IGIC)

1113Sofia, Acad. G. Bonchev St. Bl. 11;
Tel. (+ 359 2) 872 48 01, Fax: (+359 2) 870 50 24
E-mail: info@svr.igic.bas.bg
URL: http://**www.igic.bas.bg**

The activities of the Institute of General and Inorganic Chemistry cover
several areas in inorganic materials science: development of novel methods for synthesis of single crystal, powdered, thin-layer and composite materials; studies of their composition, structure, surface and bulk properties; 39 design of materials with preset electrical, magnetic, optical, semiconductor, superconductor, ferroelectric, adsorption, catalytic, biological, mechanical, and other properties.

In recent years the Institute is one of the leading scientific institutions in the field of preparation and characterization of materials for environmental protection, energy storage and utilization of natural chemical resources. In 2005 under the 6th FP of EC IGIC was recognized as a Centre of Competence on Multifunctional Materials and New Processes with Environmental Impact (MISSION). In 2007 within the framework of PHARE, a Centre of Transfer of Environmentally Oriented Technologies and Innovations in the field of inorganic chemistry (TRANSMISSION) was established at IGIC. At the end of 2008 IGIC was funded by the National Science Fund of Bulgaria as a lead contractor to organize, together with three other research institutions, a National Centre of Excellence for New Materials (UNION).

TECHNOLOGIES

Single crystals for laser equipment
Catalysts and sorbents for purification of gases and liquids
Combined inorganic-organic adsorbents
Thin films and membranes for catalysis and photocatalysis
Nanostructured thin layers for gas sensors
Electrode materials for lithium-ion batteries Materials for hydrogen accumulation Nanostructured thermoelectric oxide materials Superhard materials and coatings Nanocrystal and amorphous oxide materials Bioceramic materials Water-salt systems
Technologies for utilization of marine chemical resources Development of highly sensitive and selective instrumental methods for determination of the content of specific components and admixtures in various matrices
Determination of micro- and macro components in environmental samples, inorganic and organic materials Speciation analysis Analysis of inclusions in minerals

EQUIPMENT

Atomic absorption spectrometers (flame, graphite furnace); inductively coupled plasma atomic emission spectrometer; X-ray fluorescence spectrometer Ultraviolet-visible spectrophotometers; infrared spectrometers Electron spectrometer for X-ray photoelectron spectroscopy, Auger spectroscopy and secondary ion mass spectrometry Powder X-ray diffractometer; electron paramagnetic resonance spectrometer; High-resolution electron microscope Devices for determination of micro- and macro hardness, for specific surface area and pore distribution measurements in solids; for determination of the electron conductivity
Equipment for thermogravimetric analysis, differential thermal analysis with mass spectrometric analysis of gases; thermo programmed reduction, thermo programmed desoprtion
Mass spectrometer for light gases; analyzer of carbon monoxide and nitrogen oxides in waste gases

DEPARTMENTS:

Inorganic Materials
Solid Surface Chemistry
Chemical Analysis

LABORATORIES:

Intermetallics and Intercalation Materials
Synthesis, structural and spectroscopic analysis of new electrode materials for lithium-ion batteries, solid protonic conductors and nanostructured thermoelectric oxide materials. Synthesis and adsorption-desorption characteristics of new composite materials for hydrogen storage. Electron paramagnetic resonance and solid-state nuclear magnetic resonance.

High Temperature Oxide Materials
Synthesis, structure of non-traditional glasses, single crystals, and transparent ceramics with participation of transition and rare earth oxides for application in optics and electronics. Preparation and investigation of different C/Si02 containing composites with practical applicability by processing of renewable agricultural wastes. Thermogravimetric analysis, differential thermal analysis.

Crystal Chemistry of Composite Materials
Non- conventional synthesis (mechanochemical, sonochemical, combustion) of composite materials (including nanosized) with application in electronics, energy, medicine and catalysis. Crystallochemical design of new tailored oxide and boride materials. Crystallographic characterization of inorganic compounds.

Salt Systems and Natural Resources
Chemistry of aqueous-salt systems. Synthesis, characterization and technologies for inorganic salts and chemical reagents, including biomaterials for bone implants. Clean technologies for utilization of natural mineral resources and waste products. Design and production of new products, rich in micro-elements, for the medical cosmetics. Ecology studies on non-living natural resources, mainly surface water systems and soils.

Reactivity of Solid Surfaces
Studies of reactions on solid surfaces by means of spectral methods (IR spectroscopy, DR UV spectroscopy). Design of catalysts for environmental purposes: Full oxidation of volatile organic compounds, control of NOx in waste gases.

Surfaces of Dispersed Materials
Synthesis, modification, characterization and application of classical (activated carbon, diatomaceous earths) and new (hybrid materials, metal organic frameworks) adsorbents. High-resolution electron microscopy, ther mo-programmed reduction.

Electron Spectroscopy of Solid Surfaces
Electron spectroscopy analysis of solid surfaces. Adsorption and reactions on metal and oxide surfaces. Investigation of surfaces and interfaces of semiconductors. Synthesis and characterization of nanostructured thin oxide films for catalytic, photo catalytic, gas sensor and optical applications. Preparation and characterization of nanosized oxides (press powders) for synthesis of magnetic materials, sensors, catalysts.

Analytical Chemistry
Atomic absorption spectrometry, atomic emission spectrometry, X-ray fluorescence spectrometry, spectrophotometry, separation and preconcentration methods, obtaining of new spectral data, green analytical chemistry, trace analysis in environmental and industrial samples; analytical chemistry of rare metals; phytorecovery of rhenium.

Theoretical and Computational Chemistry
Theoretical studies of structure, geometrical, electronical and physicochemical properties of surfaces, periodic structures and metal complexes with magnetic, optical, catalytic and biological properties; Prediction of structures; Simulations of absorption, emission, IR, Raman, NMR and Moss- bauer spectra.

IGIC was founded in 1960 as a result of the splitting of the former Chemical Institute of BAS.

Institute of Organic Chemistry with Centre of Phytochemistry (IOCCP)

1H3 Sofia, Acad. G. Bonchev St., Bl. 9;
Tel. (+359 2) 872 48 17, Fax: (+359 2) 870 02 25
E-mail: iochem@orgchm.bas.bg
URL: http://**www.orgchm.bas.bg/index_en.html**

The Institute of Organic Chemistry with Centre of Phytochemistry carries out basic and applied research in synthetic organic, organometallic and bioor- ganic chemistry, as well as in the application of spectroscopic and theoretical methods for investigation of organic materials and natural products.
The main activities are directed to: Development of new methods for synthesis of organic compounds, including stereo selective C-C-bond forming reactions via catalytic metal-mediated processes and synthesis of new chiral ligands for fine tuning of the catalytic activity and efficiency within different enantioselective processes.

Design and synthesis of different libraries of new organic compounds - bioactive products, dyes, new materials for nanotechnologies.
Determination of the structure of organic and inorganic compounds, as well as of polymers by NMR spectroscopy in liquid and in solid state.
Study of molecular dynamics and interactions by means of NMR spectroscopy.
Investigations of organic compounds and noble metal nanoparticles by means of UV-VIS absorption, fluorescence and FTIR spectroscopy.
Study of the relationship between the structure and spectral properties of these compounds, in order to design and synthesize fluorescent markers for nucleic acids, proteins and noble metal nanoparticles, of antitumor agents and of chemical sensors. Study of biologically active compounds and drugs by means of steady state and time resolved fluorescence measurements.
Isolation of natural compounds originating from Bulgarian and foreign medical and aromatic plants, propolis, non-poisonous mushrooms, insects and nautical organisms in order to characterize their chemical constitution and to find new biologically active substances for medicine and pharmacy.
Investigation of the oxidation mechanism of nutritious fats and oils in order to improve their quality and prolong the terms of their preservation.
Development of new analytical methods (HPLC, Gas Chromatography and Mass Spectrometry) for investigation and standardization of food products aiming to prove their quality and authenticity.
Creation of new biotechnological methods for preparation of protein hydrolizates with application in new food quality studies.
Isolation of pectin polysaccharides from leeks acting as immunomodu- lators; determination of their carbohydrate and amino acid contents. Studies of reaction mechanisms and stereochemistry; molecular design of drugs and materials for optoelectronics. Modelling of ligand-receptor interactions and rational drug design, assessment and prediction of toxicity.
Agricultural wastes utilization for active carbon production, applied for potable and waste waters purification.
Development of new heterogeneous catalysts for processing of hydrocarbon raw materials and obtaining of ecologic and alternative fuels. Preparation and characterization of nanocomposite materials on the basis of ultra dispersed diamond powders used as catalysts supports. Study of the possibilities to respect the legislation norms for lignite combustion in Thermal Power Plants.

EQUIPMENT

Chemical laboratories equipped according to the European standards NMR spectrometer Bruker Avance 11+ (600 MHz)
NMR spectrometer Bruker DRX-250
High precision IR Fourier Spectrometer
High resolution mass spectrometer DFS, Thermo Scientific
UV-VIS Spectrophotometer Lambda 25 (Perkin Elmer)
Spectrofluorimeter LS 55 (Perkin Elmer)
Apparatus for high-efficiency liquid chromatography
Gas chromatographs
Scanning microcalorimeter
Protein crystallization chamber
NIR and UV/VIS spectrometer
Equipment for IR spectroscopy
Apparatus for picosecond time resolved fluorescence measurements Computational complex for advanced investigations on molecular design, new materials and nanotechnologies.

LABORATORIES:

Organic Synthesis and Stereochemistry
Methods for preparation of chiral compounds and catalysts for enantiose- lective transformations in the organic synthesis. Application of metal-containing reagents for synthesis of multifunctional compounds and materials with application in life sciences and for nanotechnologies.

Structural Organic Analysis
Studies on the structure of organic and bioorganic molecules, noble metal nanoparticles, ions and complexes in the ground and excited state by conventional, linear and circular dichroic vibrational spectra, absorption and luminescence spectroscopy, X-ray diffraction and quantum-chemical methods.

Physical Organic and Computational Chemistry
Kinetics and mechanisms of reactions in solutions, theoretical studies on reactivity and steric structure of organic, as well as mechanisms of organic reactions in ground and excited state.

Nuclear Magnetic Resonance
Studies on the structure and dynamics of organic compounds by means of NMR spectroscopy and other spectral, theoretical and chemical methods. Development of new methods of NMR spectroscopy.

Natural Product Chemistry
Chemistry and biological activity of natural products with emphasis on their application in medicine, nutrition and ecology.

Lipid Chemistry
Mechanisms of lipid oxidation and inhibiting action of natural anti-oxidants. Development of chromatographic methods for analysis of acylglycerols and fatty acids. Changes of plant and animal lipids under the influence of stress factors.

Chemistry and Biotechnology of Proteins and Enzymes
Analysis of connective and breathing proteins, hydrolytic enzymes and enzymatic inhibitors. Spectral studies on protein structure and protein interaction. Protein crystallization and X-ray analysis. Studies on the charge interactions in proteins structures and establishment of relationships between the structure and function of proteins and enzymes. Studies on the chemical reactivity, chemical bonds and the reactions catalyzed by them. Establishing the mechanistic principles of biocatalysis (enzymes, ribozymos, abzymes) and their application in bioorganic synthesis

Organic Reactions in Microporous Materials
Organic synthesis on zeolites, micro- and mesoporous molecular sieves. Methods of synthesis, modification and characterization of porous materials.

Solid Fuel Chemistry
Chemical composition and structural characteristics of solid fuels and agricultural by-products and the processes taking place at different thermochemical treatments. Estimation of the possibilities for their utilization.

Bioactive Carbohydrates - Plovdiv
Development of methods for extraction, characterization and application of biologically-active compounds of plant origin.
IOCCP was founded in 1960. The Research Centre on Phytochemistry is established at the Institute in 1977

Institute of Physical Chemistry „Acad. Rostislaw Kaischew“ (IPC)

1113Sofia, Acad. G. Bonchev St., Bl. 11;
Tel. (+359 2) 872 75 50, Fax: (+359 2) 97126 88
E-mail: physchem@ipc.bas.bg
URL: http://**www.ipc.bas.bg**

The activities of the Institute of Physical Chemistry include investigations of thermodynamics and kinetics of phase formation of nanosized gas, liquid and crystal nuclei in mono- and multi-component systems; self-organization phenomena on crystal surfaces; formation of epitaxial layers, one- and two-dimensional phases; surface alloying; initial stages of electrocrystallization of metals and alloys. Among the recently developed fields of research are crystallization of protein molecules and electrochemical synthesis of new composite materials consisting of conducting polymer layers and metal micro- and nanoparticles suitable for electrocatalytic applications. The kinetics of phase formation and the relaxation of glass-forming materials are investigated. Nanostructured materials by controlled crystallization and sinter-crystallization are designed and characterized. The vitrification of hazardous waste is studied. Thermodynamic and kinetic properties of glass- forming melts and polymers are studied by computer modelling. The stability of colloid systems - foams, emulsions and suspensions - is studied. The surface forces in thin liquid films - short-range and long-range interactions - are determined. Amphiphilic monolayers, bi-layers and foams, stabilized by synthetic surfactants, phospholipids, (bio)polymers, etc. are investigated, as well as molecular structures and self-assembly in nanofilms. Surface electrical properties and particles' dimensions are determined in aqueous media and in the presence of surfactants and polymers adsorbed on the particles. The obtained results are applicable in oil and food production, water treatment, medicine, ecology and biotechnology. Investigations are carried out on currentless deposition and electrodeposition of different metals and alloys including iron group metals with amorphous structure. Studies are performed on magnetic behavior, mechanical properties and thermal stability of thick and thin coatings; hydrogen evolution and permeation in different substrates; deposition and electrodeposition of nano-composite coatings containing different types of nanoparticles; self-organization phenomena and formation of periodic spatio-temporal structures during electrodeposition of alloys; hydroelectrometallurgical processes of electro-wining and electro-refining of different metals; protective-decorative and functional oxide layers on aluminium and its alloys; corrosion behavior of different materials including low- and high-alloyed steels; copper alloy anodes and oxidized titanium anodes coated with various oxide layers. The properties of the obtained new materials are examined with different methods.

Since 2005 IPC is distinguished as a Centre of Excellence in the field of nanoscale phenomena and structures in bulk and surface phases. Since 2010 the Institute is approved as Scientific and Technical coordinator of Infrastructure for investigations of new materials for industrial, biomedical and environmental applications; diagnostics, restoration and conservation of metal artifacts.

EQUIPMENT

Electron microscopes with EDX analysis X-ray equipment
Equipment for the electrochemical synthesis and characterization of metals and alloys
Microinterferometric setup for the study of surface forces in thin liquid films
Drop and bubble shape tensiometer with double dosing system and contact angle module
Electro-optical apparatus for the study of electrical surface properties of colloid particles
Equipment for thermal analysis
Equipment for complex corrosion electrochemical studies Equipment for the investigation of hydrogen evolution during electrodeposition and metal electroextraction
Equipment for the investigation of metal layer magnetic characteristics Laser interferometry, apparatus for protein crystallization in temperature gradient

DEPARTMENTS

Phase Formation and Crystal Growth
Phase formation kinetics; crystal growth mechanisms; thin solid films and epitaxy; protein crystallization; step bunching and morphological instability; electro-crystallization of metals and alloys; electrochemical synthesis of conducting polymers and metal-polymer composites.

Surface and Colloid Science
Thin liquid films; black films - formation and stability; foams - synergism, stability and application; adsorption dynamics, surface dilational elasticities and viscoelasticities; electro-optic phenomena in colloids; electrical and optical properties of disperse systems and their stability; soft micro and nanostructured materials: application in medicine and ecology.

Electrochemical Deposition and Dissolution of Metals and Alloys
Electrochemical processes during metal and alloy deposition and dissolution; structure formation and self-organization phenomena in electrodeposited metals and alloys; hydrogen deposition and permeation in different metals and alloys; hydrometallurgy - electrowinning and electrorefining.

Electrochemically Obtained Materials and Corrosion Processes
Kinetics and mechanism of deposition of currentless or electrodeposited protective, decorative, magnetic and nanostructured metallic, alloy, amorphous and oxide layers for corrosion protection, heterogeneous catalysis and electrocatalysis; cathodic protection systems - composition and characterization. Corrosion characterization of low- and high-alloyed steels. Investigation and practical application of conversion coatings obtained from environmentally friendly electrolytes.

Amorphous Materials
Thermodynamic properties, kinetics of relaxation and crystallization of amorphous materials; Nanostructured glass ceramics; Immobilization of hazardous waste into glasses, glass ceramics and ceramics. Marble glass- ceramics design. Statistical physics of disordered states and their computer modelling; synthesis of amorphous and semi-crystalline materials (glass- ceramics, polymers and amorphous thin films).
IPC was founded in 1958 on the basis of the Department of Physical Chemistry of the Institute of Physics, BAS.

Institute of Polymers (IP)

1113Sofia, Acad. G. Bonchev St., Bl. 103-A;
Tel./Fax: (+359 2) 870 03 09
E-mail: instpoly@polymer.bas.bg
URL: **www.polymer.bas.bg**

The research activities of the Institute of Polymers include investigation and training in the field of polymers and polymer materials. The main stress is on application of the scientific results - new products and technologies for implementation in the Bulgarian economy and society. An important branch in the institute activity is the development of novel polymer materials and technologies and nanotechnologies. The Institute carries out interdisciplinary studies related to medicine and pharmacy, ecology, agriculture, alternative energy sources, food and biotechnologies. The Institute is the coordinator of the module „Novel Materials for Pharmacy and Medicine" under a project for establishment and development of the National Centre for Advanced Materials UNION, supported by the National Science Fund. Since 2004 the Managing Board of the Union of Chemists in Bulgaria and the Scientific Council of the Institute of Polymers grant annually the „Prof. Ivan Schopov" prize to a prominent young scientist working in the field of polymer science. The institute collaborates with the University of Chemical Technology and Metallurgy, Sofia, the Faculty of Chemistry at the University of Sofia „Sv. Kliment Ohridski ", the Technical University, Sofia, the University of Shumen „Bishop K. Preslavski", the University of Plovdiv „Paisii Hilendarski", University „Prof. Asen Zlatarov", Burgas, and others.

EQUIPMENT AND FACILITIES

DAWN DSP (Wyatt) for determining the absolute molecular mass and particles size via light scattering
Analytical ultracentrifuge ProteomeLab™ XL-I (Beckman Coulter) for thermodynamic and hydrodynamic characterization of macromolecules in solutions.
Waters-440 equipment for determination of molecular weight and molecular weight distribution of polymers.
Modul FTA Instrument (Stanton Redcroft) for determining the limiting oxygen index.
Universal modular rheometer RheoStress 600 (Thermo Haake) for determining the rheological parameters of liquids.
HZ-1005B dynamometer for testing tensile strength, percentage of elongation, tensile modulus, modulus of elasticity, flexural strength. HZ-1072A impact testing machine.
AVS-310 apparatus (Schott Geraet) for automatic viscosity determination of polymer solutions.
IR spectrometers IRAffinity-1 (Shimadzu) with reflectance measurement attachment, and Vector 22 (Brucker).
UV spectrometer DU 800 (Beckman Coulter).
Optical microscopes Zetoplan NU-2 (Reicher) and DMLP (Leica). Differential scanning calorimeter DSC-7 (Perkin Elmer).
Microwave reactor RotoSYNTH (Milestone Sri).
Gas chromatograph Carlo Erba 4100.
LDC-SJP-35 a single screw extrusion pelletizer line.

LABORATORIES:

Amphiphilic and Ionogenic Polymers
Synthesis of macromolecular architectures of controlled hydrophilic-hydro- phobic balance, including block, graft and comb-like copolymers, segmented copolymer networks and interpenetrating polymer networks. Synthesis and properties of novel stimuli-responsive polymer materials; development of hydrophilic and amphiphilic copolymer networks and polymer/silica hybrid hydrogels for application in membrane technologies, ecology, biotechnology and controlled drug delivery.

Bioactive Polymers
Novel polymer materials for medicine, pharmacy, agropharmacy, and environment protection. Nanostructured and nanosized materials from biocompatible and/or (bio)degradable synthetic polymers and/or polymers from renewable sources: new generation wound dressings; drug delivery systems; polymer carriers for enzyme immobilization; materials for water purification; environmentally friendly agropharmaceuticals; nanofibrous scaffolds for tissue engineering; hybrid materials for photodynamic cancer therapy and for treatment of multidrug resistant pathogens. Nanofibrous materials obtained by electrospinning - a cutting-edge nanotechnology for fabrication of continuous fibers of diameters in the nanoscale. Developed electrospinning devices and approaches for targeted design of nanofibrous materials.

Conjugated Polymers
New solid polymer electrolyte materials for membranes for polymer electrolyte membranes fuel cells. Two main types of polybenzimidazole (PBI) membranes are under development: low temperature membranes (operating temperatures up to 100°C), PBI membranes containing crosslinked polyvinylphosphonic acid (PVPhA) or PBI with grafted PVPhA chaines, and high temperature membranes (operating temperatures up to 180°C) based on cross-linked PBI doped with phosphoric acid. Investigations on the proton conductivity, chemical stability and mechanical properties of the new polymer membranes. Polymer membranes for micro- and nano-filtration and thin polymer films for electronic applications. Development of methods for preparation of conjugated polymers (carbonyl-olefin exchange reaction).

Polymerization Processes
Synthesis and properties of water-based environmentally friendly polymer materials. Generation of water-soluble macromolecules and hydrogels by means of modern synthetic chemistry methods like controlled ion and radical polymerization, organic symthesis and photochemistry. These materials are characterized by specific inter- and intra-molecular associative interactions in aqueous medium, which leads to formation of nanoaggregates or nanodomains. The aim is to obtain novel types of smart materials. Studies on the interactions during the formation of nanoparticles in copolymer solutions, and in hydrogel structures.

Structure and Properties of Polymers
Synthesis and characterization of electroactive polymers and polymer materials with various potential applications as organic conductors, electronic elements, etc.; preparation and characterization of new polymeric materials based on polymer blends and composites.

Phosphorus Containing Monomers and Polymers
Synthesis of low molecular, oligomeric and polymeric substances that contain hydrogen phosphonic (P-H) moiety. Hydrogen phosphonates are have high reactivity as intermediates in the synthesis of: biocompatible/ biodegradable phosphorus-containing polymers for polymeric drug preparations; biologically active compounds for applications in pharmacy, medicine and agriculture; phosphorus-containing polymer additives for preparation of ecologically-oriented products with improved adhesion, and reduced flam- mability, and others.

Institute of Catalysis (1C)

1113Sofia, Acad. G. Bonchev St., Bl. 11;
Tel. (+359 2) 97125 51, Fax: (+359 2) 97129 67
E-mail: icatalys@ic.bas.bg
URL: http://**www.ic.bas.bg**

The Institute of Catalysis carries out research in the field of: heterogeneous, homogeneous and ecological analysis, kinetics of catalytic reactions; catalytic design, development and selection of new catalytic systems, technologies for catalyst production, destruction and stabilization of organic and polymer materials, stabilizer development, methodologies and application of electron paramagnitic resonance.
The IC hosts the Club of the Bulgarian catalysis specialists, the Bulgarian Society on Electron Paramagnetic Resonance and the Academy of Sciences for Environment Protection.
The main fields of research are:
Mechanisms of catalytic reactions; kinetics of catalytic ractions in stationary and non-stationary conditions; physico-chemistry of surfaces, ecological catalysis; quantum chemistry methods in catalysis; reactions in oscillatory regime; methods for selection of catalysts; development of new industrial catalysts and adsorbents; zeolites - synthesis, properties and application in catalysis; application of catalytic processes in organic synthesis, oil chemistry, oil refining and nitrogen industry, catalyst desactivation; reactions of ozone with organic and polymer substances and biological materials; homogeneous catalysis and catalysis with organometallic complexes; chemical stabilization; EPR and ENDOR spectroscopy of disordered systems; synthesis and properties of ceramic fiber materials; mechano-chemical activation. Developed and industriallly introduced are: merium-temperature and high- temperature catalyst for carbon oxide conversion with water vapour; catalyst for fine porufucation of nitrogen-hydrogen mixture of carbon oxide and carbon dioxide through methane; low-temperature catalyst for carbon oxide methaning; catalyst for vapour conversion of methane; catalyst for ammonia decomposition; catalyst for obtaining of oxygen-free atmosphere; catalyst for plant oil hydrogenation; catalyst for purification of waste waters from sulphide ions; iron oxide for soft and hard ferrites; kieselguhr as catalist carrier; catlyst for hydrogenation of nitrobenzene to aniline; catalyst for selectivehydrogenation of crotone aldehyde to fatty aldehyde; catalyst for hydrogenation of crotone aldehyde to butanol and 2-ethylhexanal to 2-ethylhexanol; automated system for control of the technological production process „Ethylene Oxide"; high-efficiency anti-ozonants, anti-oxidants and anti-wear components in the production of tyres and rubber products; homogeneous complexes of transition metals with conjugated ligands as efficient catalysts for oxidation and hydrogenation of organic compounds; optical media for CD and DVD information storage based on polymethine dyes and octa-octa-alkyl-phthalocyanines with photoresistant tiolene complexes; microprocessor multi-channel system for data acquisition and processing of chromatographic information; automated system for kinetic studies; gradi- ent-free laboratory reactor operating in gas and liquid phase at normal and high pressure; combined pneumatic pressure and flow regulator; devices for dosage of gas samples; ozonizers for medical and industrial purposes.

METHODS AND EQUIPMENT

Method for estimation of the lifetime of industrial hydrogenation catalysts
Method for charging of ethylene oxide production reactor X-ray photoelectron spectroscopy (XPS), Electron Paramagnetic Resonance (EPR)
Moessbauer Spectroscopy (MS), IR spectroscopy, IR spectroscopy of adsorbed forms
UV spectroscopy, electron microscopy, X-ray analysis Steady and non-steady state kinetic
Theoretical methods - quantum chemistry, solid state theory, density functional theory
Differential scanning calorimetry
Mass-spectrometry
Gas chromatography and applications in catalysis Liquid chromatography
Laboratory and semi-industrial testing of industrial catalysts

LABORATORIES:

New Catalytic Materials and Nanosized Catalysts
Structure of catalysts and adsorbents; Suported metal catalysts; Synthesis and selection of catalysts; Synthesis and activity of metal oxide catalysts.
New supported gold nanosized catalysts developed for the production and purification of hydrogen, for the complete oxidation of volatile organic compounds and reduction of nitrogen oxides; Design of structures and systems with controllable and pre-set properties and operating conditions. Nanosized particles of transition metal oxides synthesized by modified mechanochemi- cal method, developed at the laboratory. The so prepared materials are catalytically active in reactions aimed at rotection of the environment and production of alternative fuels.

Catalytic Processes for Energy Production and Environmental Protection
Catalysis for environmental protection; Kinetics of heterogeneous catalytic reactions; Experimental methods in the chemical kinetics; Analysis of surfaces.
Catalytic processes for the production of ecologically clean fuels and environment protection; kinetics of heterogeneous catalytic reactions; experimental methods in the chemical kinetics; surface analysis; molecular catalysis; Synthesis of nanosized multifunctional catalytic systems for hydrotreatment of oil fractions based on heteropolycompounds with specific structure. Nanostructured catalysts, modified with noble metals for the production of hydrogen fuel from biomass. Synthesis of catalysts for obtaining hydrogen by reforming of methane with carbon dioxide. Highly efficient and selective catalysts for manufacturing clean motor fuels.

Molecular Catalysis with Centre for EPR Spectroscopy
Chemical stabilization; Destruction of polymeric materials; Photocatalysis; Quantum chemistry and ESR spectroscopy in catalysis; Molecular catalysis. Chemical stabilization; photocatalysis; polymer materials destruction; Nanosized semiconductor photocatalysts for continuous purification of waters and air from organic and inorganic pollutants. Chemistry of ozone reactions and its utilization in advanced technologies for environmental protection and for other chemical, medical, pharmaceutical and perfumery purposes, etc. Laboratory scale reactors and pilot installations, including both batch reactors and continuous flow reactors, suspension slurry state reactors and photoreactors and ozonators for sterilization technologies. Quantum chemical investigations on modelling interphase boundaries. A methodology based on the Density Functional Theory (DFT) for developing catalytic models and models of solid surfaces, including intercalated systems.

Central Laboratory of Applied Physlcs-Plovdiv (CLAP)

4000 Plovdiv, 59, Sankt Petersburg Blvd,
Tel. (+359 32) 63 50 19, Fax: (+359 32) 63 28 10
E-mail: ipfban@mbox.digsys.bg
URL: htpp://**www.clap-bas.com**

The Central Laboratory of Applied Physics with an Innovation Centre carries out research, development, and pilot production within the following priorities: Equipment design, transfer of technologies and production technologies in the field of nanosized, nanostructured and nanocomposite layers and superhard coatings; research and industrial application of Ohmic contacts, assembly and packaging of electronic components, including MEMS and NEMS; research and industrial application of energy effective LEDs lighting, including UV light emitting diodes. A wide range of sensors: photo-, magneto-, thermo-, radiation sensitive and capacitance sensors, as well as sensor units are produced. Microwave sensors and photoprobes, and a range of light emitting diodes are developed. Over 2 million power infrared light emitting diodes for remote control have been sold in Russia, Ukraine and Turkey. High power, high frequency, high temperature SiC MESFETs; high power, high temperature SiC p-n diodes and high voltage, high frequency, high temperature SiC p-i-n diodes have been developed. A series of thermoelectric cooling-heating devices based on Peltier elements is developed and produced. An industrial PVD equipment and technology for electric arc deposition of hard coatings is designed and realized. Industrial equipment and technology for electrodischarge polishing is realized. Equipment and technology for electric arc deposition and electrodischarge polishing, as well as polishing of details and coatings deposition can be ordered. Technology for nanostructured superhard coatings and nanocomposites on a high technological PVD equipment „Platit я80^{+}“ is developed. A variety of coatings can be ordered. Multifunctional equipment „Compact Platform CPX-MHT/NHT“ and methods for measurements of micro- and nanohardness, adhesion, Youngs modulus and coefficient of friction of hard and superhard materials and coatings are mastered.
Energy saving lighting devices based on superluminescence light emitting diodes (LEDs) in the visible spectral range are designed. The influence of High power UV LEDs on biological objects is studied.

METHODS

Characterization of semiconductor materials and devices by photoluminescence, Hall effect, capacitance-voltage, Auger electron spectroscopy and high energy electron diffraction High temperature measurements of Ohmic and Schottky contacts Measurement of thermal processes in power transistors Electro-optical characterization
Measurement of micro- and nanohardness, Young's modulus, adhesion and coefficient of friction of hard and superhard materials and coatings

EQUIPMENT

Molecular beam epitaxy with separate chambers for Si, lll-V compounds and Auger analysis
Liquid phase epitaxy of lll-V (GaAs, GaAIAs) compounds Technological processing line for semiconductor lll-V devices Technological processing line for semiconductor ll-VI (CdS, CdSe) devices

Metallization - thermal and e-beam evaporation and magnetron sputtering within the same technological process Dielectric coatings Photolithography Complete assembly line for packages and packaging of semiconductor chips in metal-glass, metal-ceramic and plastic packages Industrial equipment for electric arc deposition of hard coatings Electric arc deposition system „Platit я80^{+}“ for nanostructured super- hard coatings and nanocomposites Industrial equipment for electrodischarge polishing of metals „Compact Platform CPX-MHT/NHT“ for measurements of micro- and nanohardness, adhesion, Young's modulus and coefficient of friction of hard and superhard materials and coatings

DEPARTMENTS

Microelectronics, Optoelectronics, Sensor Devices and Technologies
Research and industrial application of micro- and optoelectronic devices; UHV technologies; thin films; hard and superhard coatings, including nanocomposites.

Technologies and Thin Films Characterization
Research and development of dielectric and metallic films for microelectronics; multilevel metallization and modifying interfaces; characterization of thin films, micro- and nanohardness of superhard materials and coatings.

Energy Saving Systems and Energy Efficiency
Thermoelectric cooling-heating systems; energy-saving LED lighting devices; UV LEDs influence on biological objects.

Design Engineering
Design and production of sensors, sensor devices, LED lamps, systems and custom-designed equipment.

The CLAP was founded in 1979.

BIOMEDICINE AND QUALITY OF LIFE

Institute of Molecular Biology „Acad. Roumen Tsanev“ (IMB)

1113Sofia, Acad. G. Bonchev St., Bl. 21;
Tel./Fax: (+359 2) 872 35 07
E-mail: imb@bio21.bas.bg
URL: http://**www.bio21.bas.bg**

The Institute of Molecular Biology is a leading Bulgarian scientific institution in the field of molecular and cellular biology. The Institute conducts high-level research in the fields of molecular mechanisms of the cell cycle; genome organization, expression and integrity; yeast genetics; design and synthesis of biologically active substances and recombinant proteins; testing of novel nano-materials.

Scientific Fields:
Genome stability, Cell cycle regulation, DNA replication and repair Epigenetics
Molecular mechanisms and treatment approaches for socially significant diseases including cancer and cardiovascular diseases Design of new metabolic inhibitors and medication Genomics, proteomics and bionanotechnologies Structural biology and bioinformatics.

METHODS AND EQUPMENT

Isolation and fractioning of proteins and nucleic acids, ultracentrifugation, electrophoretic and chromatographic methods Recombinant DNA technology Cell cultures
Measurement equipment: Spectrophotometers, spectrofluorimeter, scintillation counter, fluorescence microscopes, PCR apparatus, Real-Time PCR apparatus, photo-document systems, IR scanning system, flow cytometry, liquid-liquid 2D proteomics system equipped with sample preparation robot

DEPARTMENTS

Molecular Biology of the Cell Cycle
Molecular aspects of the cell cycle control and regulation in higher eukaryotes. Mechanisms of activation and repression of the cell cycle check points and the accompanying DNA damage and repair processes. Epigenetic alterations in DNA and histone proteins, transcription and recombination. Developing tools for enhancing cancer cells sensitivity to anti-cancer drugs and for site-directed delivery of these drugs to the target cells in order to lower the toxicity of the anti-cancer therapy and to increase its efficiency.

Structure and Function of Chromatin
DNA reparation at nucleosomal level, chromatin remodelling processes, synchronization of DNA synthesis and unfolding during replication. Function of the HMG box-containing proteins considered „architecture" factors and their post-translational modifications modulating their biologic role. Participation of the HMGB proteins and their specific receptors in tumorogenesis.

Gene Regulation
Regulation of gene expression; alternative translation initiation in bacteria; expression of eukaryotic genes in bacterial cells; post-translational modifications of recombinant proteins; structure-function of cytokines; glycation of proteins and nucleic acids in bacteria; structural biology; genomics and bioinformatics.

Molecular Design and Biochemical Pharmacology
Directed synthesis of biologically active compounds, protein and non-protein amino acids, and novel platinum complexes. Modelling of chemical structures - peptide mimetics designed to interfere with solid tumors progression by inhibiting angiogenesis. Construction of novel and efficient biomaterials to function as specific drug vehicles. Pharmacobiochemical investigations of biologically active substances including therapeutic agents. Microbial diversity and activity in polluted areas.

Laboratory of Yeast Molecular Genetics
Regulation of the genome activity and its dependence on the chromatin structure. Epigenetic control of gene expression in yeasts and higher eukaryotic cells. Applicable methods for detection of harmful substances in food, medicines and environment.

Laboratory of Medical and Biological Research
Genome and proteome markers taking part in the progression of atherosclerotic alterations in blood vessels, heart insufficiency and diabetes. Biologic activity of nano-matherials/nano-particles and the construction of novel biocompatible and biodegradable nano-materials for medical use.

IMB was founded in 1960 as a Central Biochemical Laboratory and has its present name since 1977.

Institute of Neurobiology (INB)

Sofia, Acad. G. Bonchev St., Bl. 23;
Tel. (+359 2) 979 21 51,
Fax: (+359 2) 871 91 09
URL: http://**www.bio.bas.bg/neurobiology**

The Institute of Neurobiology carries out basic and applied research in the field of neurosciences: investigations on the neurobiological mechanisms of organization, adaptation and regulation in the organism of humans and animals, and the pharmacological control of these proceses. The strategic goal is to obtain new knowledge and to create new diagnostic and prognostic methods, aimed to improve the quality of life, the intellectual and physical abilities of human beings by means of new interdisciplinary neurophysiological, psychophysiological and pharmacological approaches.

METHODS

Electrophysiological, behavioural and psychophysiological methods: electroencephalography, electromyography, electrooculography, stabilography, contemporary methods for analysis of neuroelectrical brain and muscle activity, multichannel high resolution registration of electroencephalogram and event-related brain potentials, polysomnography analysis of sleep; stereotaxic technique, microinjection of substances into different brain structures, microdialysis, sensory and electrical stimulation, quantitative pharmaco-neu ronography and pharmaco-electroencephalography in studies on unanaesthetized experimental animals; tracing of CNS-paths, dissection of discrete brain regions, enzyme-activity determination, labeled compounds; contractility of smooth muscles; excito-neurotoxicity, nerve cell culturing in vitro.

EQUIPMENT

Computerized generators of static and moving one- and two- dimensional visual stimuli Multi-channel electroencephalographs
Computerized system for posturography
PC-based device for recording and processing of head movement parameters

PC-based system for manual and oculomotor activity recording and processing
Neuromorphological and neurochemical equipment Stereotaxic apparatuses
Apparatus for studying exploratory behaviour, locomotor activity, anxiety, pain, learning and memory
Devices for studying behaviour and cognition in animals Devices for biochemical studies
Equipment for microdialysis and neurotransmitter determination in CNS Devices for studying smooth-muscle electrical and contractile activity ELISA-reader Cell-culture equipment
The following original devices have been designed:
Time-modulation perimeter
Stabilograph system able to eliminate the patient's weight Electrogastrograph for non-invasive registration of human gut electrical activity
Computerized system for biomechanical investigations of blood vessels

DEPARTMENTS

Sensory Neurobiology
Investigations on the human visual system. Processing the information about colour, obtained from short-wave cones in the human retina; coding of visual information of the spatial structure of images and the temporal characteristics of visual signal processing; perception of visual motion and changes in its velocity and direction; perception of 3D shape of objects, and their shape and spatial disposition in visual scenes under static and dynamic conditions.

Cognitive Psychophysiology
Higher cognitive functions, including attention, memory, decision making and strategic planning. Neurophysiological mechanisms of cognitive and sensorimotor information processing in brain networks. Evaluation of these mechanisms through analysis of the neuroelectric brain potentials and oscillations in normal and pathological conditions such as Parkinson's disease, sclerosis disseminata, attention-deficit/hyperactivity disorder, etc.

Neurobiology of Adaptation Processes
Disturbances of learning and memory, seizure reactivity, mechanisms of nociception and analgesia, neurobiological mechanisms of addiction and abstinence, electrophysiological and neurological alterations due to brain ischemic stroke. Functional neuroanatomy relationship between different neuronal circuits involved in the control of adaptation. Pharmacological approach to the correction of disadaptation at central and peripheral levels.

Behavioural Neurobiology
Neurobiological mechanisms underlying the brain plasticity, neuronal activity and hemispheric asymmetry in intact animals, and in models of aggression, pain, fetal alcohol syndrome, aging, depression and others. Hemispheral assymetry of the behavioural reactions in norm and in pathology. Involvement of neurotransmitters and neuropeptides in brain structures related to lateralized behavioral responses.

Synaptic Signaling and Communications
Regulatory mechanisms of synaptic and non-synaptic communications in central and autonomic nervous system. Neurotransmitter interactions and neuromodulatory role of neuropeptides under normal and pathological conditions such as hypoxia/ischemia, oxidative stress, Parkinson's and Alzheimer diseases, inflammatory processes, and new therapeutical approaches for their treatment.

Biological Effects of Natural and Synthetic Substances
Biological activity of natural and synthetic compounds, the role of transmitter systems, and the possibilities of control and optimization of drug action. Antioxidant activity of known and newly-synthesized medicinal products, aiming at cell-protection from free-radicals. Experimental drug toxicology, aiming at elucidation of the toxic action of medicinal products and the oxygen active forms on the cellular regulatory mechanisms.
Academic Information Centre on Neurosciences
Provides on-line access to data bases of SpringerLink, ISI Web of Knowledge and Scopus. The library fund of the Centre contains more than 23 500 volumes.

The INB was founded in 1947 as an Institute of Experimental Medicine. It was named the Institute of Physiology in 1960, and in 2006 it was reorganized into the Institute of Neurobiology.

Institute of Microbiology „Stephan Angeloff“ (IMicB)

1113Sofia, Acad. G. Bonchev St., Bl. 26,
Tel. (+359 2) 979 31 57, Fax (+359 2) 870 01 09
E-mail: micb@microbio.bas.bg
URL: http://**www.microbio.bas.bg**

The Institute of Microbiology is a national centre for microbiology research, which carries out research activity in the field of general, applied and infectious microbiology, virology and immunology. The investigations on morphology and fine structure, physiology, biochemistry and genetics of pathogenic and saprophytic microorganisms include integrated approach focused on the organismal, cellular and molecular levels. The studies include microbial metabolism and its regulation; cellular responses to physiological stress and mechanisms of adaptation to extreme conditions; molecular genetics identification of pro- and eukaryotic microorganisms; discovery of new species of bacteria and yeasts, analysis of the nucleotide sequence and cloning of bioactive metabolite genes. Production, characterization and study of the mode of action of microbial biosurfactants; biotransformation of steroids. Intensive investigations on the biosynthetic capacity of microorganisms (incl. extremophyles) are the base of the development of starter microbial cultures for Bulgarian milk products, enzymes, antibiotics, amino acids, alkaloids, etc. Investigations on various aspects of the environmental microbial ecology - environmental control (soil and waters), and methods for their purification; data are obtained for the biodiversity of microorganisms in the hot Bulgarian springs and in the Antarctic soils. Infectious microbiology research is focused on genetic markers of the Mycobacterium tuberculosis drug-resistance, causative agents of zoonoses of bacterial origin, bacterial pathogenicity and virulence, and the selection of novel antimicrobial agents of plant, microbial and synthetic sources, the role of lactic acid bacteria for the health of women. Modern methods for bacteriological control of food products of animal origin (milk and meet) are developed. The Institute is one of the European leaders in the field of experimental chemotherapy of viral infections (enteroviral infections, flu, herpes simplex, etc.): establishment of novel inhibitors of virus replication, drug-resistance, combination effects, mode of action (viral proteins targets); characterization of antiviral microbicides. Studies on the pathogenesis of influenza and the oncogenic role of human papilloma viruses. Application of the oncolytic effect of parvoviruses for the treatment of malignant diseases. The immunological studies are directed to autoimmunity mechanisms and approaches for treatment of autoimmune diseases and sepsis, and on the characterization of novel immunomodulators of natural or synthetic origin. Mathematical modelling of microbiological processes is developed. Scientists from the Institute are members of expert commissions at the Council of Ministers of Bulgaria, various ministries and agencies.

METHODS

Transmission and scanning electron microscopy, confocal microscopy, cytobiochemistry.
Batch and continuous cultivation of microorganisms from free and immobilized microbial cells and suspension cultures of endemic plants. Genetic transfer, substrate hybridization, PCR, genome carts. Virological methods: cloning of viruses, viral protein analysis, genetic markers of drug-resistant mutants, determination of antiviral activity, combined effects and cytotoxicity, experimental models in vivo - influenza, enterovirus infections, etc.
Immunochemical methods.
Models of infections, inflammations and tumors.
Chromatographic and analytical methods for determination of enzyme activity.

EQUIPMENT

Transmission electron microscope, confocal, fluorescence and light microscopes
Laser flow cytometer Fermentors, shakers and centrifuges Scintillation counter
Spectrophotometers, equipment for electrophoresis and chromatography
PCR, real-time PCR and vacuum blotting facility Laminar flow cabinets, ELISA reader

DEPARTMENT

General Microbiology

Laboratories: Morphology of Microorganisms and Electron Microscopy
Ultrastructural organization of pathogenic and non-pathogenic microbial species. Cytochemical and immuno-cytochemical localization of enzymes and biopolymers. Changes in the ultrastructure and cytochemical characteristics depending on the culturing method, including immobilization on different carriers and nanomaterials, as well as under the influence of surface active substances, biological signals and physico-chemical factors. Antigen variations - diversity of the surface phenotypes of bacterial cells. Biofilms - structural-functional properties, growth activation and inhibition.

Microbial Genetics
Genetic analysis of lactic acid bacteria, streptomycetes, methilotrophic and filamentous yeasts. Molecular taxonomic characterization of Lactobacillus isolated from Bulgarian dairy products. Investigation of their probiotic potential and the molecular mechanisms of industrial stress resistance. Isolation and molecular genetic analysis of vaginal lactobacilli. Increasing antibiotic productivity of industrial Streptomycetes strains. Cloning and sequence analysis of genes responsible for spectinomycine biosynthesis in Streptomyces flavopersicus. Construction of yeast Hansenua polymorpha strains for heterological gene expression. Genetic and biochemical analysis of Trichosporon cutaneum yeast capable of effective degradation of toxic aromatic and aliphatic compounds. Investigation of biodegradation potential of microbial strains in industrial waste water and soils by obtaining of appropriate DNA sequences.

Microbial Biochemistry
Enzymes (RNAses, phosphatases, proteinases, amylases) - secretion, characterization, properties. Neuraminidases - properties, isolation and characteristics

of specific substrates, studies on the biological role in infection. Psychrophylic bacteria - stress proteins and adhesions. Biosurfactants of microbial origin: biosynthesis, physico-chemical properties, applications. Chemical and microbial surfactants - changes in the properties and composition of the surface cell structures. Biodegradation of lipophylic compounds. Microbial transformation of steroids.

DEPARTMENT

Applied Microbiology

Laboratories:

Microbial Biosynthesis and Ecology

Mechanisms in the regulation and control of microbial synthesis of biologically active substances (organic acids, amino acids, antibiotics, enzymes), by different strains-producers. Physicochemical and technological optimization of the cultivation of the strains-producers. Characterization and optimization of the processes of separation, purification and identification of the end biotechnological products. Metabolism and possibilities for its regulation in microbial cells, producers of biologically active substances and food additives, as well as assimilating non-conventional raw materials. Investigations on the interactions between microorganisms and environment in water and soil ecosystems. Physiological response of microorganisms to pollutants: phenol and its derivates, heavy metals, etc. Physicochemical and microbiological estimation of natural ecosystems.

Extremophilic Bacteria

Investigations on the biodiversity in Bulgarian hot springs, taxonomic classification of the isolated bacteria and identification of non-culturable species in the natural communities by molecular biology techniques. Physiologo- biochemical properties of isolated from Bulgarian hot waters thermophilic and alkaliphilic bacteria-producers of industrially valuable enzymes. Enzyme synthesis by free and immobilized cells in batch and continuous cultures. Characterization of purified enzymes.

Applied Biotechnology

Metabolism of prokaryotic and eukaryotic cells and its regulation: physiology and biochemistry of yeasts and biosynthesis of biologically active substances (enzymes, carotenoids, exopolysaccharides); biological diversity of psychrophilic yeasts from Livingston island, Antarctica and study of their biological potential (enzymes, lipids, polysaccharides). Lactic acid bacteria: isolation, selection and screening of natural strains of lactic acid bacteria; metabolics production by lactic acid bacteria and by starters; production of antimicrobial substances; proteolytic systems of lactic acid bacteria; new solutions for formation of symbiotic biosystems for production of healthy dairy foods. Plant in vitro systems: production of low molecular weight biologically active substances (including alkaloids, pigments and antioxidants for medicine and food industry) by in vitro systems of different plants; optimization of the biosynthetic processes, isolation, purification and identification of the produced metabolites; different new strategies for enhancement of the yield and effectiveness of the biotechnological processes (selection, elicitation, two-phase cultivation etc.).

Research Group of Mathematical Modelling and Computer Methods

Methods and algorithms for modelling and optimization of the microbiological processes. Biogas and biogas technologies.

DEPARTMENT
Infectious Microbiology

Laboratories:

Zoonoses and Bacterial Virulence
Pathogenic bacterial causative agents of infectious diseases, common for humans and animals (zoonoses), like yersiniosis, campylobacteriosis, listeriosis, melioidosis, paratuberculosis, etc. Factors and mechanisms of bacterial virulence and their possible application in clinical practice for elaboration of new fast and specific methods for diagnostics of infectious diseases. Prophylaxis by development of new generation of vaccines and development of fast and reliable methods for detection of food-borne pathogens in food products of animal origin, mainly milk and meat. Epizootic and microbiology studies on the role of wild animals, migrating birds and their ticks on dissemination of yersiniosis, campylobacteriosis and tularaemia in Bulgaria and along the East-European flyway.

Genetics and Drug Resistance of Mycobacteria
Mycobacterial pathogenesis, fundamental molecular biological research on tuberculosis and mechanisms of latent tuberculosis. Molecular mechanisms of drug resistance in M.tuberculosis. Molecular epidemiology of tuberculosis, phylogeny and evolution of mycobacteria. Immunomodulators against tuberculosis. Molecular-genetic methods for determination of mutations, connected with drug resistance in strains of Mycobacterium tuberculosis and complex investigation of the transmission and epidemiology of tuberculosis in Bulgaria using population structure analysis.

Antimicrobial Agents
Antibacterial and antifungal activities in vitro and in vivo of natural or newly synthesized compounds. Analysis of extracts of different species of plants, microalgae, metabolites isolated from Antarctic lichen, red and brown sea algae, propolis, etc. Screening of wide spectrum of newly designed and synthesized chemical compounds for antibacterial and antifungal activities. Photobiological and photodynamic inactivation of bacterial pathogens

Photophysical and photosensitizing properties of phthalocyanine complexes as potential antibacterial and antiviral agents applicable in medicine, food safety and ecology.

DEPARTMENT
Virology

Laboratories:

Viral Proteins
Purification and characterization of viral particles and structural proteins of paramyxoviruses, picornaviruses, etc. Development of kits for diagnostics of viral infections. Determination of the oxidative stress markers for influenza virus infection. Effects of antioxidants and antiviral chemotherapeutic agents on the free radicals processes in experimental influenza.

Experimental Chemotherapy of Enterovirus Infections
Screening of synthetic and natural products for in vitro antiviral activity against enteroviruses, respiratory syncytial virus and human adenoviruses, combination effect of enterovirus replication inhibitors, drug-resistance to enteroviral replication inhibitors, effect of antiviral agents in experimental enterovirus infections in laboratory animals (encephalitis, myocarditis), antiviral microbicides.

Experimental Chemotherapy of Influenza Infections
Screening of synthetic and natural products for in vitro antiviral activity against influenza viruses and the pestivirus BVDV (surrogate hepatitis C virus), combination effects of chemotherapeutic agents with anti-flu action in models both in vitro and in experimental flu infection in mice, pulmonary makers of flu infection, study of resistance to anti-flu chemotherapeutic agents by phenotypic and molecular genetic markers, antiviral microbicides.

Oncolytic Viruses
Oncolytic effect of the rat parvovirus H-1 on models of solid, metastatic and lymphoid tumours in laboratory animals. Screening for in vitro antiviral activity of natural and synthetic substances against herpesviruses (herpes simplex virus types 1 and 2, human cytomegalovirus), combination effects of antiherpetic agents. Screening for antiviral activity against vaccinia poxvirus, antiviral microbicides.

DEPARTMENT
Immunology

Laboratories:

Immunomodulators
Determining on a molecular level how inflammation impairs bone formation and the extent to which signalling pathways are altered in patients with osteoarthritis and in murine models of arthritis. Screening and revealing mechanism of action of substances with potential anti-inflammatory activity with regard to innate immune cells and cytokines.

Immunopathology and Experimental Immunotherapy
Change in the natural course of an autoimmune disease in mouse models and humanized transfer models of lupus by administering chimeric molecules, which makes possible to suppress selectively the activity of targeted autoreactive B and T-lymphocytes. New therapeutic strategies in sepsis treatment through the development and use of improved „next generation" immunoglobulin preparations with enhanced anti-inflammatory activity.

Nonspecific Resistance
The immunomodulatory properties of natural substances and their synthetic analogs, including coumarin, 7-hydroxycoumarin, yeast superoxide dis-mutase and molluscan hemocyanins in order to assess the perspectives for their use for prophylaxis of infectious diseases.

Section „Mycology"
Filamentous fungi at the molecular, cellular, whole organism and biocenotic levels; Role of the oxidative stress, harmful effects of free oxy-radicals and antioxidant enzyme defence in free and immobilized cells of micelles, relation between the oxidative stress and other stress factors (temperature,

heavy metals, etc). Regulation of enzyme synthesis in both free and immobilized cells. Biodiversity and biotechnological potential of Antarctic filamentous fungi. Mechanisms of action of fungicidal substances. Biodegradation as a result of the action of filamentous fungi and possibilities for its elimination.

Atelier „Pasteur“
Courses for postgraduate training of young microbiologists from South- Eastern European countries in modern methods for diagnostics and investigation of microorganisms and viruses: PCR, real-time PCR, molecular genetic markers for drug-resistant mycobacteria, etc. Improvement of the PCR methods for detection of human papilloma viruses. Molecular epidemiological study of the role of human papilloma viruses in etiology of cervical pre-cancer states and cancer in the Bulgarian population. Study on the participation of certain viruses in the pathogenesis of the Balkan endemic nephropathy.

IMicB was founded in 1947.

Institute of Biophysics and Biomedical Engineering (IBPhBME)

1113 Sofia, Acad. G. Bonchev St., Bl. 105;
Tel. (+359 2) 979 26 30, Fax: (+359 2) 872 37 87
E-mail: ibphbme@bio21.bas.bg
URL: http://**www.bio21.bas.bg/ibf/**, **http://www.clbme.bas.bg/**

The Institute of Biophysics and Biomedical Engineering carries out investigations on: structure-functional interactions between lipids and proteins in biological membranes, electro- and photo-induced phenomena in cells, bioelectrical processes in excitable cells; elucidation of the mechanisms of membrane-associated pathological processes; modelling of lipid-protein, pigment-lipid and inter-cellular interactions by means of model lipid membranes, biophysical molecular and mathematical models; development of methods and equipment for registration, processing and analysis of electrophysiological signals; development of algorithms, software and hardware devices for medicine and application of IT in healthcare; regulation of motion and biomechanics.

Priorities:

Complex biophysical, biochemical and physiological investigations on the role of membrane structure and properties in cellular function regulation under normal and pathological conditions.

Effects of different environmental stress factors on the functional activity of cells.
Excitability of neurons, muscle fibers and motor units in physiological and pathological conditions.
Biophysics of photo-biological processes and development of biosensors.
Cell-biomaterial interaction and investigation of cell adhesion mechanisms.

METHODS

Registration, processing and analysis of electrophysiological signals and data and their application in diagnostic and therapeutic equipment. Methods and algorithms for pattern recognition, classification and discrimination.
Modelling and simulation of biological and medical processes and conditions.

Computer-assisted solutions
Modelling of quantitative structure-activity relationships of bioactive compounds.

EQUIPMENT

Spectrophotometers, Spectro-fluorometers, Gas-chromatograph, Scintillation counter, Luminometer
Ultracentrifuge, Automated system for microscopic image analysis and processing, Patch-clamp, Electromyography, Electroencephalography,
Inverse fluorescence microscope
High-sensitivity differential scanning microcalorimetry
Differential scanning densitometry
Cell culture laboratory
Computerized stations for analysis of signals from different electrocardiographic leads' systems Set-up for microelectrode investigations
Automated system for electrophysiological and biomechanical investigations
HPLC detection of aminoacids (Asp, Glu, GABA) after in vivo brain micro-dialysis
Isometric force measurements in resistant blood vesselss (Mullvany's myography)
Polarographic oxygen rate electrode

DEPARTMENTS

Excitable Structures
Biophysics of intracellular and extracellular potential fields. Electrogenesis in muscle and nerve fibers. Motor unit activity in health and disease - muscle force gradation. Electromyography and functional state of muscles. Motor control and sensorimotor interaction. Mathematical investigation of the mechanisms of nerve excitability in simulated demyelinating neuropathies and neuronopathies in the peripheral and the central nervous system. Membrane ion channels - conductivity, kinetics and regulation. Tranmission of chemical signals. Calcium signaling, intracellular systems involved in the signaling. Electro-mechanical and pharmacomechanical coupling in smooth muscle cells. Neurotransmitter of neuropeptides in normal and pathological conditions.

Lipid-Protein Interactions in Biological Membranes
Lateral and transversal organization of lipid molecules in biological membranes. Role of phospholipids and their metabolites in transmembrane signal transmission. Asymmetric localization of membrane lipids - transport mechanisms and regulation under normal and pathological conditions. Oxidative lipidomics: dependence of microdomain formation and stability on the degree of lipid peroxidation. Influence of prebiotics on the structure and functions of liver membranes.

Photoexcitable Membranes
Mechanisms of light energy transformation in biological membranes (higher plants, cyanobacteria and their mutants); role of the structural organization of pigment-protein complexes, lipid composition and physicochemical properties of thylakoid membranes for the efficiency of the primary photosynthetic processes; pigment-lipid interactions in model membranes; mechanisms of adaptation of photosynthetic apparatus; role of lipid-protein interactions in the response of photosynthetic organisms to environmental changes; involvement of active oxygen species in stress-induced inactivation processes; development of biosensors using photosynthetic membranes.

Electroinduced and Adhesive Properties
Electroporation. Influence of the electrical field on the membrane permeability. Electrotransfer of macromolecules in cancer and normal cells. Electrical properties of biological membranes. Electroinduced changes in cell adhesion - adhesion, cell proliferation, viability, reorganization of cytoskeleton and cell-junctions. Biocompatibility of new materials with application in tissue engineering and regenerative medicine.

Biomacromolecules and Biomolecular Interactions
Dynamics of biological macromolecules and structure/function relationship. Thermal stability of proteins and complex biological systems. Macroorganization of pigment-protein complexes, factors modulating their conformation, integrity and function (lipids, biogenic organic compounds, steroids, ion strength and others). Application of thermodynamics in medicine - microcalorimetry of serum proteome (screening technology for diagnostics and monitoring of a wide range of diseases).

Processing and Analysis of Biomedical Data and Signals
Methods, algorithms and electronic devices for registration, transfer, analysis, and visualization of electrophysiological signals; removal of parasitic noise components with maximal preservation of the informative patterns in the signals; diagnostic interpretation of biomedical signals and data for autonomous cardiac control and its clinical application; non-invasive determination of physiological parameters with clinical application; new types of electrostimulation signals and defibrillation pulses; analysis of cardioversion during invasive electrophysiological studies and ablation, analysis of the transthoracic bioimpedance.

QSAR and Molecular Modelling
QSAR (quantitative structure-activity relationships) and molecular modelling approaches for characterization of the relationship between the structure of chemical compounds and their biological effect. The models are based on integral and local 2D and/or 3D structural features and the effects may be medicinal (therapeutic), toxic and others. Depending on the information available on the 3D structure of the target biomacromolecule, ligand-based and structure-based approaches are used, including: pharmacophore modelling, molecular fields analysis, homology modelling of proteins, docking and virtual screening of bioactive compounds, identification and analysis of protein-ligand interactions, formation of chemical categories using different chemometrical methods. The applications are in the field of rational drug design and evaluation of the toxic effects of chemicals on human health and environment.

Biomechanics and Control of Movements
Biomechanics and control of human limbs by the nervous system, modelling and simulation of muscle and muscle motor units mechanical activity. Investigation of forces of different motor units evoked by different stimulation patterns. Development of technical devices for prevention of spinal column disorders and of experimental methodology for estimation of back muscle activity in norm and pathology. Studying of changes in bioelectrical signals generated

by brain, nerves and muscles' structures in norm and pathology. Improvement of diagnostics and methods for medical treatment of nerve- muscle disorders, application of the investigations in rehabilitation and optimal training of sportsmen.

Bioinformatics and Mathematical Modelling
Utilization of contemporary information technologies and development of intelligent systems for support of the diagnostic and therapeutic processes in applied healthcare. Modelling of pathologic processes and patients' databases, knowledge formalization of the decision making in medical diagnostics and treatment. Development of health screening and monitoring programmes. Application of contemporary system analysis, engineering, mathematical and computer oriented methods and software tools, analysis, modelling, control and optimization of bioprocess systems. Application of the approaches of generalized nets and intuitionistic fuzzy sets in medicine.

IBPhBME was founded in 2010 through merging of the Institute of Biophysics (founded in 1994 as the Central Laboratory of Biophysics and transformed into institute in 1967) and the Centre of Biomedical Engineering (founded 1994)

Institute of Biology and Immunology of Reproduction "Acad. K. Bratanov" (IBIR)

1113 Sofia, 73, Tsarigradsko shose Blvd;
Tel. (+359 2) 93113 95, Fax: (+359 2) 872 00 22
E-mail: ibir@abv.bg
URL: http://**ibir.bas.bg/**

The Institute of Biology and Immunology of Reproduction carries out fundamental and applied research in the field of reproductive biology and immunology in humans and animals. The main scientific goals of the Institute are: improvement of the reproductive health and overcoming human infertility and the demographic collapse in the country and Europe; increasing fecundity and fertility in farm animals of economic value; improvement of the natural food resources and quality of life. The investigations are aimed at clarifying the cellular and molecular mechanisms of biological interaction and the role of environment in the reproductive process. The research topics include: factors and mechanisms involved in gametogenesis, fertilization, implantation and pregnancy; research on stem cells; influence of steroid reproductive hormones on the differentiation and function of immune-competent cells; metabolic processes relevant to the adaptation mechanisms of gametes in storage and cryopreservation conditions; role of membrane and intracellular bio-molecules in the cryogenic storage and preservation of gametes; new biotechnological approaches to micromanipulation, embryo transfer and artificial insemination in animals; applied research with diagnostic significance for human reproductive health and animals reproduction control.

METHODS

Biological and biochemical methods for: isolation, cultivation and characterization of reproductive cells and tissues; stem cells in humans and animals; analysis of somatic and germ cells.
Micromanipulation workstation dedicated for cell technologies, cytological, histological, immunohistochemical and immunofluorescent methods and techniques.

Immunological, immunochemical and physicochemical methods of analysis, 2D electrophoresis, RT-PCR, hybridoma cell lines techniques, ELISA, ELISPOT analysis, SDS-PAGE, Western blot, Chromatography analysis, RIA-based and noninvasive methods for hormonal status evaluation.
Biotechnologies for germ cells in vitro storage and cryopreservation, biotechnologies for in vitro fertilization, embryo transfer and artificial. Diagnostic testing of samples from patients with unexplained infertility. Diagnostic and expert evaluation of the reproductive process in animals.

EQUIPMENT

Laboratory for confocal and bright light microscopy: confocal fluorescent microscope and bright light microscopy with information and image processing system, equipped with an appliance for Reflected Light Fluorescence Microscopy.

Laboratory for cell cultures, physical and chemical analyses:
classical automated sperm analyzer, flowcytometer, system for real-time detection of nucleic acids, chromatography HPLC system, inverted bright- light microscopes, laminar flow cabinets, C02 cell culture incubators and centrifuges.

Laboratory of reproductive biotechnology, embryo transfer and cryopreservation of gametes: laminar flow cabinets with built- in stereomicroscopes, workstation for cell technologies, micromanipulation system, microtome cryostat, laboratory freezer at -120°C, cryoconservation facility with liquid nitrogen containers and electron microscope.

Laboratory for proteomic analysis: proteomic analysis system, vertical PAGE system, Ethan DIGE scanner for 2D gels obtained by Differential in Gel Electrophoresis (DIGE), with an option for simultaneous detection of more than two fluorescent dyes, 2D scanned gel images data processing software.

Laboratory for radioisotope assays: ultracentrifuge, scintillation counter.

DEPARTMENTS

Immunobiology of Reproduction
Factors and mechanisms controlling cell proliferation, differentiation and apoptosis in female and male reproductive system. Identification, characterization and functional activity of receptor and ligand molecules involved in the interaction between gametes. Immune-endocrine regulation of the ovarian function. Biological and clinical significance of ovarian antigens autoimmunity. Local regulatory factors and mechanisms in the structural remodelling and cellular immunity during implantation and early pregnancy. Development of model systems and methods for examining fertility of gametes in vitro, role of cumulus cell for Oocyte retrieval quality, diagnosis and therapy of immunologically-based infertility in humans and animals. Role of the metalloproteinases in normal and pathological mammary gland. Mechanisms of innate and acquired immunity in Sertoli cells and Sertoli induced T-cell subpopulations.

Reproductive Biotechnology and Cryobiology of Gametes
Factors and mechanisms of action of biologically active substances during in vitro storage and during conditions of hypothermia of gametes, embryos and stem cells; characterization of biologically active molecules and structures with a key role in the fertility potential of gametes. Isolation and proteomics of seminal plasma proteins and identification of their role in the mechanism of protection and long-term storage of gametes. Analysis of biomolecules and

metabolic processes in the germ cells in relation to their biological properties at short-term storage or ultra-low temperatures; markers of functional status and expression of apoptosis of sperm, oocytes, embryos, stem cells. Effect of oxidative stress on the vitality of the sperm during in vitro storage. Antioxidant protection against apoptosis initiating reactive oxygen species in spermatozoa. Heat shock research and possibilities to overcome its adverse effects on sperm storage; sperm cryopreserva- tion and establishing of gene banks of genetically valuable indigenous and endangered breeds. Mechanisms of cryogenic damage in stem cells and reproductive cells and tissues in humans and animals.

Embryobiotechnologies in Animals

Reproductive problems of livestock in naturally occurring reproduction, methods and approaches for maximum utilization of their natural reproductive capacity. Studies on oestrus superovulation and synchronization between donor and recipient (cows, sheep, goats, buffaloes), using various hormonal preparations and schemes during the estrum, early and late anestrum. Surgical and non-surgical methods for obtaining and transfer of embryos (in mice, rabbits, sheep, goats and buffaloes). Morphological characteristics of oocytes and embryos of different species at cellular and subcellular level, as well as the species differences in the dynamics of pre-implantation embryo development. Methods for the cultivation of fresh embryos in vitro and in vivo and their long-term storage by freezing. Influence of biologically active substances with non-hormonal origin on the farm animals reproductive potential.

Molecular Immunology

Isolation and characterization of mesenchymal stem cells (MSC) from organs and tissues of adults. Methods for clinical applications of MSC as immunomodulatory agents in patients with autoimmune diseases. Influence of steroid reproductive hormones on the expression of proteins with immunomodulating activity of human mesenchymal stem cells isolated from endometrium, early decidua, fat and bone marrow. Culturing human embryonic cells (cell line BG01V) in the absence of animal products. Obtaining and differentiation of induced pluripotent stem cells of human MSC and human blood cells. Isolation and characterization of human stem cells: search for new targets for treatment of skin cancers. Specific markers of tumor stem cells.

Imunoneuroendocrinology

Neuroendocrine control of reproductive functions. Hypothalamic-pituitary- gonadal axis in women and men. Impact of unfavorable environmental factors on the endocrine and immunological mechanisms of subfertility. Chronobiology and neuroendocrine mechanisms of adaptation. Relationships between the pineal gland and adrenocortical axis. Immunological aspects and physiological significance. Neuroendocrine homeostatic regulation of immune reactivity: Immediate regulatory interactions between the neuroendocrine and the immune system.

IBIR was founded in 1938.

Institute of Experimental Morphology' Pathology and Anthropology with Museum (IEMPAM)

1113 Sofia, Acad. G. Bonchev St., Bl. 25,
Tel. (+359 2) 979 23 11, Fax: (+359 2) 871 01 07
E-mail: iempam@bas.bg,
URL: http://**www.iempam.bas.bg**

The Institute of Experimental Morphology, Pathology and Anthropology with Museum carries out fundamental and applied research in the field of human and veterinary medicine, which has a significant role in solving of important health and demographic problems. In the field of experimental morphology and pathology the studies concern the pathological and clinical aspects of infectious, non-infectious and parasitic diseases. The regulatory mechanisms of cell differentiation are explored with the aim to elucidate the pathogenesis of socially significant diseases. Novel diagnostic methods are being developed and biomarkers are being identified for degenerative, cancer and autoimmune diseases, infections and infertility. Experimental model systems are being designed to study the impact of environment and lifestyle on human health. A complex approach (in vitro, in vivo and in ovo) is being developed to study the biological activity and safety of chemicals and bioproducts. The Institute provides expert opinions for the biotechnological industry and for diagnosis of animal diseases with severe economic impacts.
Studies in the field of anthropology are focused on the anthropological and antropogenetical characterization of the Bulgarian population that elucidates the development of anthropological types in Bulgarian lands. Further studies include the processes of acceleration and deceleration; elaboration of physical development standards; identification of anthropometric markers for diagnosis of different diseases of high priority for human health.
The National Anthropological Museum (NAM) is a unique scientific, educational and cultural institution, specialised in the elaboration and representation of original anthropological reconstructions and exhibits. NAM is very active in popularization of contemporary anthropological knowledge in order to preserve the national identity, cultural and historical heritage.

METHODS

Electron microscopy (transmission and scanning)
Light and fluorescence microscopy
Histological methods: histochemistry, enzyme-histochemistry, immuno-histochemistry
Autoradiography
Cultivation and cloning of cells and viruses; tissue and organ culturing Immunochemical methods
Biochemical methods - electrophoresis, chromatography, HPLC, spectrophotometry
DNA and RNA analysis; PCR Anthropological and anthropometric methods

EQUIPMENT

Electron microscopes (transmission and scanning)
Light and fluorescent microscopy

Equipment for histological techniques: microtomes and ultramicrotomes, kryostats
Equipment for cell and tissue culturing; cell and viral banks ELISA Reader
Apparatus for electrophoresis and blot-techniques, HPLC apparatus; lyophiliser, spectrophotometer, centrifuges, ultratcentrofuges PCR, Real time PCR

DEPARTMENTS

Experimental Morphology
Regulatory mechanisms of cell differentiation; identification of markers for different stages of development by applying experimental approaches and clinical studies. Pathogenic mechanisms of various diseases (degenerative, cancer, autoimmune diseases and infertility). Methods and biomarkers applicable for diagnostics, prophylactics and treatment. Impact of the environment and lifestyle on the human health.

Pathology
Pathological and clinical aspects of malignant, infectious, non-infectious and parasitic diseases. A complex approach (in vitro, in vivo and in ovo) for the study of the biological activity and safety of chemical and biological products with immunomodulatory, anti-tumor, antiviral and antiparasitic activity, especially their cytotoxicity, gen-toxicity, carcinogenicity, mutagenicity and teratogenicity. Expert opinions for the biotechnological industry and diagnostics of animal diseases with severe economic impacts.

Parasitology
Research on pathological and clinical aspects of parasitic diseases in humans and animals. Studies on the complex mechanisms of interaction in the host-parasite system and the influence of the geochemical environment and anthropogenic factors.
National Anthropological Museum with Research Group (NAM)
The Museum is a cultural and educational institution registered by the Ministry of Culture and ICOM-Paris. The investigations are organized in two basic research fields: Anthropology of the population living in Bulgaria - high- priority investigations for human health protection; and Paleoanthropology and museum work in accordance with the national and European priorities „National Identity" and „Cultural and Historical Heritage".

SPECIALIZED LABORATORIES

Electron microscope laboratory
Autoradiographic laboratory

IEMPAM was founded in 2010 through merging of the Institute of Experimental Morphology and Anthropology with Museum (founded 1995) and the Institute of Experimental Pathology and Parasitology (founded1995).

Institute of Biodiversity and Ecosystem Research (IBER)

1113 Sofia, 2, Yuri Gagarin St.;
Tel. (+359 2) 871 71 95, Fax: (+359 2) 988 28 97
E-mail: iber@iber.bas.bg
URL: http://www.iber.bas.bg

The Institute of Biodiversity and Ecosystem Research is a National center for studying and protection of the biodiversity of Bulgaria. Its mission is to provide high level of the scientific research in both theoretical and applied aspects of biodiversity, ecology, environment protection and sustainable use of biological resources, to prepare highly qualified specialists in the field of ecology, environmental genetics, hydrobiology, parasitology, conservation biology, botanies, mycology, zoology, evolutional biology; to provide scientific information and methodological assistance to governmental institutions.

Priorities:

Structure and functioning of biotic communities, and ecosystems.
The variety of organisms and their ecological and evolutionary relationships at all organizational levels (from the genetic and population level to the level of ecosystem/biome).
Phylogenetics and dynamics of biota and its components - flora, mi- cota and fauna.
Scientific foundations of nature protection - study of threats and harmful/threatening factors and development of methods for their elimination or reduction.
Approaches and methods for sustainable management of protected natural sites and biological resources.
Biology and ecology of economically and socially important species; regulation of the invasive alien species-invaders, pests, parasites and other organisms of importance to the environmental protection, medicine, agriculture, forestry, fishery, hunting and aquaculture; overall management of bioresources.
Approaches and methods for assessment of ecological status, the environmental quality and anthropogenic pressures and impacts; ecological and genetic risks, the state of biodiversity and biosafety; identification of low doses of xenobiotics, analysis of induced changes at the individual level; prediction of remote environmental and genetic effects and their impact on genetic diversity and population.

LABORATORIES AND EQUIPMENT

Laboratory unit WETLANET (Laboratories: microscope, molecular, chemical with AAS and ICP, preparation)
Laboratory on marine ecology (fluorescent in situ chlorophyll detection; liquid scintillation counter; research motorboat; scuba equipment; PAR- sensors - underwater and surface)
Licensed laboratory on autoradiography
GIS laboratory (mapping of species, habitats and cenoses)
Scanning and transmission electron microscopy, confocal microscope and GC-MS analyses of pollutants

Laboratories in the Departments:

Animal biodiversity and resources - arachnological, biochemical, entomological, ichthyo-parasitological, protozoological, ultramicrotome, phytonematological, cytogenetical laboratories, experimental laboratory for rearing of insect cultures; equipment for morphometric, karyological, molecular and field studies of mammals and birds.

Plant and Fungal Diversity and Bioresources - Cytotaxonomy, flow cytometer and DNA sequencing machine, Phytocenology, Anatomy and embryology of plants, Biology, chemistry and biotechnology of medicinal and aromatic plants, Phytochemistry, Isoenzyme, Palinology and Paleobotany.

Aquatic ecosystems -Hydrobiomonitoring, Ecological microbiology, Bio- potamology, Pelagial, Hyrdochemistry.

Ecosystem Research, Environmental Risk Assessment and Conservation Biology - chemical, analytic and entomological laboratories, insectarium, vivarium, autoclave rooms.

DEPARTMENT

Animal Biodiversity and Resources

Species biodiversity, variability, biotic affection, distribution/alignment, migrations, biology and ecology of animals in Bulgaria.
Assessment of ecological adaptation, bio-indication, the status of resources and harmful, from an economic point of view, species.
Study of the fauna, animal communities and populations.
Evolution, phylogeny and speciation of animals.
Identification of insect sex pheromones, development of pheromone and floral baits, ecological peculiarities of insect pests.
Biodiversity of parasites.
Environmental impact of parasitism

DEPARTMENT

Plant and Fungal Diversity and Bioresources

Taxonomy and evolution of plants, species content, structure and history of the flora and plant communities, species and habitats with conservation status.
Databases on biodiversity and invasive alien plant species.
Sustainable use of plants and fungi.
Biodiversity and monitoring of important rare medicinal and aromatic plants (MAPs).
Biologically active substances, monitoring, ex situ conservation through seed banking.
In vitro reproduction, analysis of biologically active substances in samples of MAPs, in vitro cultures and ex vitro adapted plants; determination of the biological activity of plant extracts.

Floristic and plant diversity in Bulgaria - dynamics, evolution, conservation and sustainable management.
Modern methods for assessment of biodiversity and natural resources. Distribution and assessment of the risk of the invasive alien species. Preparation of strategic documents for floral conservation in Bulgaria. Studies of the biodiversity evolution.
Taxonomy of fungi, species with economic value; fungi protection; fungi as bio-indicators of pollution; fungal secondary metabolites as therapeutic agents.

DEPARTMENT
Aquatic Ecosystems

Biodiversity and ecology of river, lake and marine communities. Functional role of biodiversity in aquatic ecosystems Cycles of major nutrients and role of the biotic communities in regulation of the environmental status
Flows of (bio)mass and energy; role of key or economically valuable species and communities for biological productivity in the hydro- ecosystems.
Biocenology and biogeochemistry of freshwater and coastal areas. Microbiology of surface waters and wastewater.
Processes of self-purification and bio-manipulation of water bodies, modelling of biological and ecological processes/events in the aquatic environment.
Sustainable use of resource species/communities; bio-manipulation of water bodies.
Management and bio-monitoring of surface water bodies, wetlands and coastal waters, scientifically-based management of natural water bodies, conservation of biodiversity in water bodies;
Biological/ecological indication and classification of water bodies by means of the biological quality elements.

DEPARTMENT
Ecosystem Research, Environmental Risk Assessment and Conservation Biology

Factors and mechanisms leading to loss of biodiversity in the country and indicating ways of avoiding, mitigating and overcoming.
Key processes, key components in the functioning of ecosystems. Ecological processes in ecosystems in the medium and long term. Estimation of ecosystem benefits for the society.
Modelling of ecosystems and communities and the processes of transmission and transformation of materials and energy flow in them Monitoring of ecosystems, modelling ecosystem processes and the development of forecasts and scenarios for sustainable management. Assessment of atmospheric pollution by heavy metals and toxic elements through the moss.
Indicators to assess the state of ecosystems.
Risk assessment for wild birds in areas with wind farms.
Invasive species of insects.
Spatio-temporal variations of the structure of mammalian communities. Sound communication and echolocation in mammals and application in monitoring and protecting the environment.
Ecotoxicology and Biomonitoring with fungi, mosses, seed plants, animal organs and tissues for analysis of the environmental situation. Thermoregulation and physiological adaptations.
Genotoxicology and genetic monitoring.
Screening for genotoxicity, assessment of mutagenic and comutagenic peculiarities of biologically active substances.
Prevention of induced mutagenesis.

DEPARTMENT

Biomonitoring and Ecological Risk

FIELD STATIONS

„Kalimok“ Biological Experimental Station with Centre for Breeding and Reintroduction of Rare Bird Species - Tutrakan
Profile: wetlands - biodiversity, conservation biology, biological monitoring.

Laboratory of Marine Ecology - Sozopol
Profile: wetlands, marine ecology, ecology of coastal areas - ecosystem studies, biodiversity, conservation biology, biological monitoring.

„Srebarna“ Lake Ecological Station
Profile: wetlands and Danube river - studies of aquatic ecosystems and their biodiversity, conservation biology, biological monitoring.

„Plana“ Ecological Station
Profile: mountain ecosystems - ecosystem studies, biodiversity, biological monitoring.

„Beglika“ Mountain Experimental Station, Western Rodopi
Profile: mountain ecosystems - biodiversity, conservation biology, biological monitoring.

„Atanassovsko Lake“
Profile: wetlands - ecosystem studies, biodiversity, conservation biology, biomonitoring, bird ringing.

„Parangalitsa“
Profile: mountain ecosystems - ecosystem studies, biodiversity, conservation biology, biological monitoring.

SCIENTIFIC COLLECTIONS

Herbarium of Vascular Plants
166 220 herbarium specimens. Specialized collections: model collection with over 260 exsiccatae, specialized cytotaxonomic collection with 3 999 samples and 1 286 samples in a chemotaxonomic collection; briolophyta' herbarium collection with about 16 300 samples.

Mycological Collection
28 145 specimen of all groups of fungiform organisms and fungi established in Bulgaria.

Collection of Plant Fossils
Contains about 16 000 specimens of fossil plants. The reference collection includes 7270 palinological preparations of microscopic pollen types of 2 811 species.

Ex situ Collections of Rare and Endangered Plant Species
In vitro culture of rare plants and selected high-yield clones maintained in the biotechnological laboratory for medicinal plants. Seed collection of important conservation species is created.

Unicellular Green Algae (Living Collection)
Collection of unicellular green algae of the genus Chlorella and genus Chlamydomonas, originally obtained through the methods of chemical mutagenesis or hybridization, part of which are from world collections.

Scientific Collection „Invertebrates"
Total dry preparations of 243 830 specimens of insects in 1 018 ento- mologic boxes, permanent microscopic preparations of 8100 samples of Phthiraptera; „Mites": 10 800 permanent microscopic preparations of 153 000 samples; „Platyhelminthes": 3 186 permanent microscopic preparations of 8 400 samples.

Parasitological Collection
One of the richest collections in Europe of cyclophyliid cestodes, zooparasite nematodes and trematodes on birds, small mammals, and fish. Contains over 10 000 samples of hosts, as well as more than 100 000 permanent microscopic preparations.

Nematological Collection
One of the most comprehensive collections in Europe of plant nematodes, especially the species of the family Longidoridae. The collection contains over 500 000 permanent microscopic preparations and formalin collection of free-and phytoparasite nematodes from different regions of Bulgaria and the world.

Snails Collection
The collection contains over 1 000 samples - dry shells of moilusks and alcoholic preparations from over 300 species of terrestrial snails from different regions of Bulgaria, Macedonia and other countries in Europe.

Collection „Cytotaxonomic Microscope Preparations of Invertebrates
Collection of preparations, mainly insects.

Collection „Cytotaxonomic Microscope Preparations of Vertebrates"
Collection of preparations, mainly mammals.

Collection „Pisces"
The collection contains 4 356 samples of all Bulgarian freshwater fish fauna.

Collection „Mammals“
Osteological collection of mammals, collection of skins, great diversity of vertebrates in formalin and ethanol

IBER was founded in 2010 through merging of the Central Laboratory for General Ecology (founded in 1996, successor of the Institute of Ecology, 1989), the Institute of Botany (founded 1947) and the Institute of Zoology (founded 1947).

Institute of Forestry (IF)

1756 Sofia, 132, St. Kliment Ohridski Blvd.,
Tel. (+359 2) 962 04 42, Fax: (+359 2) 962 04 47
E-mail: forestin@bas.bg

The Institute of Forestry carries out fundamental, scientific and applied investigations in the field of ecology, silviculture, forest flora and fauna protection, structure and functioning of forest ecosystems and populations, their sustainable development, conservation, reproduction and utilization. The strategy for the development of the Institute is in accordance with the national features and traditions in forestry, the regional character of Balkan forests and the accepted criteria of the international organizations.
The main fields of research are:
Biological diversity of the forest flora and fauna and population genetics of tree species.
Structure, functioning, development and adaptation of the forest ecosystems in Bulgaria to the climate changes and anthropogenic influences.
Monitoring, protection and regeneration of forest diversity.
Biological pests and abiotic damages in forests - possibility for biological control and mitigation through damage-free methods and means. Socio-economic and silvicultural fundaments for sustainable, close-to- nature and multifunctional management of forest resources.
The obtained results are successfully applied in forestry and landscape design practice.

METHODS

Dendrological, geobotanical, pedological, silvicultural and inventory. Genetic, improvement and physiological.
In vitro cultivation (aseptic cultivation of tissues and organs) for micropropagation of forest tree and shrub species.
Mycological, phytopathological and entomological. Anatomic-histological, biochemical and analytical for phytomass composition, accumulation of nutritive elements and microelements, and contamination.

EQUIPMENT

Capillar Gas Chromatography KRCGC- Perkin-Elmer-3D-8420
Inductive Plasma Spectrophotometer Varian 715-ES
Laminar boxes Gelaive VB 85
UV/VIS Spectrophotometer ‘Landa 2’ Perkin-Elmer
Light microscopes, centrifuges, thermostats, electronic balances Sartorius.

DEPARTMENTS

Silviculture
Silviculture, biology, ecology, regeneration, felling and thinning, utilization of forest ecosystems; distribution, formation and sustainable management of forest habitats and the influence of silvicultural activities; evaluation of forests.

Forest Ecology
Structural and functional characteristics of forest ecosystems in conditions of climate change and possibilities for adaptation; ecological problems of forest regeneration; hydrological and soil erosion processes in forest ecosystems and evaluation of erosion control activities; cycle of matter and elements in forest ecosystems, incl. under different types of management; dendrological investigations; studies in protected areas.

Forest Genetics, Physiology and Plantations
Biological diversity of forest tree species and forest genetic resources and methods for their conservation; investigation of genetic and physiological characteristics of forest tree and shrub species; bioenergetics of ecosystems and plant species; biology of reproductive process and micropropagation of forest tree species.

Forest Entomology and Phytopathology
Abiotic and biotic damages on main forest tree species; investigations on animal pests (insects, acars, nematodes) in forests; study of diseases (fungal, bacterial, viral, mycoplasmic) on tree and shrub species; development of theoretical fundaments and practical approaches for biological and integrated control of diseases and pests in forests; phytopathologicai monitoring.

Forest Resources
Biological productivity of dendrocenoses; structure, growth, maturity and rotation of stands; economics, organisation and management of forests; methods and technologies for reproduction and utilization of forest resources.

Pedology
Genetic characteristics, classification and differentiation of different soil types; evaluation and classification of forest sites types; soil monitoring; investigation of industrial production influence on soil status; biogeochemical cycle of elements in soils.

Ecology of Wildlife
Ecology and management of main species of hunting game fauna. Methods, facilities and systems for ecological extermination of pests.

IF was founded in 1928 as a Forest Experimental Service - part of the Ministry of Agriculture and State Properties. From 1954 it is in the structure of BAS.

Institute of Plant Physiology and Genetics (IPPG)

1113 Sofia, Acad. G. Bonchev St., Bl. 21; 1113 Sofia, Tsarigradsko shose, 13 km
Tel. (+359 2) 872 81 70, (+359 2) 979 26 06, Fax. (+359 2) 873 99 52
E-mail: ifrg@bio21.bas.bg
URL: http://**www.bio21.bas.bg/ippg/bg**
http://**ifrg-bg.com**

The Institute of Plant Physiology and Genetics carries out fundamental and applied research in plant physiology, biochemistry and genetics, which are important for many problems of modern society, the most important being providing food in conditions of unfavourable climate changes. The priorities in the research activity of the Institute are connected with investigation of the basic plant physiological processes and functional organization of plant genome in normal and stress conditions; enrichment of plant genetic resources, biodiversity preservation and improvement of variety's composition of economically important crops. The studies in the field of medical biology are aimed at investigation of the genetic nature of socially important diseases.

EQUIPMENT

UV- VIS spectrophotometer „Shimadzu"-1601; thin-layer chromatograph scanner CS-930; spectrofluorimeter „Shimadzu"-1501; PAM 101-103 and PAM 2500 (portable) fluorimeters for chlorophyll fluorescence kinetic measurements; apparatus for termoluminiscence measurement; oxygen yield measurement equipment; LI 6000 portable photosynthetic system, polarographic device, phyto-chamber, conductometer, photoradiometer for measuring light intensity - HD 2302.0; light and fluorescent microscopes; photo-document system ImageQuant 150 „Amersham"; systems for distilled and ultra clean water (Water still, Merit W4000); autoclaves; C02 incubators for cell cultures; laminar boxes; centrifuges; ultracentrifuges; equipment for gradient PCR; scintillation counter; vertical and horizontal gel-electrophoresis equipment.

DEPARTMENTS

Plant Biotechnologies
Enrichment of the gene pool of economically important plant species, enancement of their resistance to abiotic and biotic stress factors, preservation of the biodiversity of valuable medicinal plants. In vitro methods and schemes for direct organogenesis, for studying abiotic and biotic stress and using the results for screening of resistible genotypes for the preservation of medicinal plants clones in danger.

Experimental Algology
Physiology and biochemistry of microalgae and cyanoprocaryotes from various taxa, placed under normal conditions and under stress. Biosynthesis of phycobiliproteins, fatty acids, sterols, polysaccharides, volatile substances, effects of abiogenic and biogenic factors (bacteria and fungi) on these processes. New technologies for algal biomass production and downstream processing. Involvement of microalgae and cyanoprocaryotes in different bionanomatrices. Increasing the germination of the medicinal plant seeds with poor germination percentage by using microalgae.

Mineral Nutrition and Plant Water Regime
Ecology, environment protection and food safety. Mechanisms of uptake, transport, metabolism and mineral element accumulation in certain crops and medicinal plants. Effects of abiotic and biotic stress factors on the processes of symbiotic N-fixation between beans plants and Rhizobium spp. bacteria. Effect of the type and the treatment rate of mineral and biologic fertilizers (on shoots and roots) on the mineral elements metabolism, and on the quantity and quality of plant yield.

Plant Stress Molecular Biology
Changes in the physiological and biochemical processes in seeds and plants under stress and possibilities for enhancement of their resistance. Biochemical, biophysical and immunochemical studies of the influence of abiotic stress, drought, high temperature, photoinhibition, salinity and swampiness on different plant objects. Changes in the expression of specific plant proteins, induction of stress related proteins and changes in the anti-oxidative protection. Processes of premature senescence provoked by unfavorable environmental conditions.

Molecular Genetics
Agro-biological investigations and application of the results in plant and livestock breeding; medical-biological research for use in novel diagnostic and therapeutic approaches in human and veterinary practice. Reparative mechanisms of the plant genome. Genetic and epigenetic regulation mechanisms of tumour suppressive genes, imprinting genes and proto-cancer genes, DNA markers for gene and genome identification in plants, structural and functional organization of plant genome.

Applied Genetics
Creation of plant genotypes with valuable economic and biological qualities by means of experimental mutagenesis and remote hybridization; genetic control of economically important properties in crops and manifestations of heterozis; genetic, physiological and cytological studies of different types of cytoplasmatic and gene male sterility; determination of molecular and enzymatic markers related to biological indicators, population biodiversity of plant pathogens and induced plant sustainability; creating sources for complex sustainability to economically important diseases in crops.

Regulation of Plant Growth and Development
Role of phytohormones and other natural growth regulators in plants under normal and stress conditions; Design of novel synthetic and biogenic growth regulators and pesticides; natural defense mechanisms in plants under biotic and abiotic stress; modulation of the protective response in plants by means of the newly designed GR in order to decrease the harmful influence of unfavourable environmental factors; biotechnology for introduction of new synthetic and biogenic growth regulators with the aim to increase the yield and resistivity of crops.

Photosynthesis
Structural organization and mechanisms of the main photochemical and biochemical reactions of the photosynthetic apparatus. Reactions of the photosynthetic apparatus to abiotic stress: drought, salinity, low and high temperatures, photoinhibition, heavy metals, UV radiation, mechanisms of damage and adaptation. Defence role of certain biologically active substances and stress-signaling function of the salicylic acid, isoprene and nitrogen oxide. Mechanisms of senescence regulation.

Citogenetics
Genetic biodiversity of wild and cultivated plant species and enrichment of important cultivars gene pool through remote hybridization; citogenetical studies of cereals genome: chromosomal and genomic manipulations; citogenetic effects of ionizing radiation and plant chemical mutagens; chromosomal reconstruction and position-dependent gene expression; inheriting and chromosomal mapping of genes, determining economically valuable parameters: productivity and resistivity to diseases.

AUXILIARY UNITS
Experimental Field Base - Sofia
Experimental Field Base - Stamboliyski
Experimental Base for Microalgae Biomass Production – Rupite

IFRG was founded in 2010 through merging of the Institute of Plant Physiology (founded in 1948 as the Institute of General Biology, and renamed in 1964) and the Institute of Genetics (founded 1976)

National Museum of Natural History (NMNH)

1000 Sofia, 1, Tsar Osvoboditel Blvd.,
Tel. (+359 2) 987 41 95, Fax: (+359 2) 988 28 94
E-mail: stoev@nmnhs.com
URL: http://**www.nmnhs.com**

The main priorities of the National Museum of Natural History are the study of biodiversity, environmental protection and the evolution of organisms.
The Museum's main task is the comprehensive research of the flora, fauna, fossils, minerals and rocks of Bulgaria and the world. The scientific fields under research are: taxonomy, systematics, phylogeny, faunistics, zoogeography and ecology of arachnids, centipedes, millipedes, insects and all classes of vertebrates; taxonomy of fossil mammals, birds and brachiopods; floristics; mineralogy. NMNH is the leading institution in Bulgaria in biospeleology, archeozoology and paleontology of vertebrates and in the studies of bats and insects. Apart from its scientific work, the Museum is very active in its exposition maintenance and the enrichment and processing of scientific collections. The museum experts grant their expertise and qualification to help state bodies, similar scientific institutions in Bulgaria and abroad and individuals, by working out statements, management plans, environmental impact assessments, assessments of minerals and hunting trophies; conducting courses for customs experts; providing consultations on the control of agricultural and forest pests and parasites. Students are given thematic presentations, connected with their studies of biology and geography.
The scientific collections kept in the Museum are the most representative of their kind on the Balkan Peninsula. They contain over 550 mammal species and about 1 990 bird species. The reptile and amphibian collection is one of the richest in Europe. The insects account for about 480 000 specimens, and the other invertebrates amount to over 300 000. The Museum preserves around one fourth of the mineral species of the world and more than 30 000 samples of fossil invertebrates. The collection of cave fauna is particularly rich and includes many species, which are not presented in any other museum in the world. Hundreds of type specimens, which were the basis for description of new species of invertebrates, are the focus of international interest. Among the exhibits are the Carolina parakeet, extinct in the world 90 years ago; the monk seal, bearded vulture, little bustard, gray and maiden crane, steppe viper, German

sturgeon, all of which are extinct in Bulgaria. In recent years, several dioramas were added to the exhibition, depicting the animal life of the Arctic, Africa, Asia and South American tropical forest. The Paleontological branch of NMNH in Asenovgrad preserves over 40 000 fossil bones of Miocene mammals which inhabited Bulgarian territories. The visitors can see the cast of a skeleton of the giant deinotherium, one of the largest terrestrial animals of all times.
NMNH, together with the Botanical Garden, is the national center for the implementation of the Washington Convention on International Trade with Endangered Species of Wild Fauna and Flora (CITES). It is also the national institution participating in the PESI project of the 7th FP of EC and a full partner in the implementation of NATURA 2000 network and in the national projects the Red Data Book of Bulgaria and the National Biodiversity Monitoring System.

METHODS

Traditional and modern methods in the fields of taxonomy, ecology and paleontology. For the study of vertebrates (bats, reptiles and amphibians) molecular, phylogeographic and cladistic methods are used. Cybertaxo- nomic methods are applied for the study of millipedes. Radio-telemetry is applied for studying the biology of some rare bat species. The feeding modes of long extinct mammals are established using the novel method of „micro wear".

DEPARTMENTS

Invertebrates
Taxonomy, faunistics, zoogeography, phylogeny, morphology and ecology of mites, pseudoscorpions, centipedes, millipedes, insects and molluscs. Investigation of the cave fauna of Bulgaria and the world. Faunistics, taxonomy and zoogeography of the beetles of the family Carabidae and of the butterflies and moths (Macrolepidoptera) of the Balkan peninsula; zoogeographical analysis of the faunas of neuroptera of the Balkan and the Apennine peninsulas. Assessment of important for preservation forest communities in Belasitza (Bulgaria and Macedonia), on the basis of indicator groups of invertebrates. Model epi- and geobionts as a potential for long-term monitoring and environment protection in Strandja (Bulgaria and Turkey).

Vertebrates
Species diversity, distribution, morphology, biology, ecology, phylogeny and conservation value of vertebrates of Bulgaria and the neighbouring countries. Systematics and distribution of freshwater fish in Bulgaria. Monitoring of amphibians and reptiles in Bulgaria and mapping of their distribution along the „Nabuko" pipeline project alignment. Terrain work on bat monitoring - fields and numbers, according to the standard monitoring schemes. National action plan for the wolves in Bulgaria. The Museum preserves one of the most significant ornithological collections on the Balkan Peninsula.

Paleontology and Mineralogy
Paleontological investigations of the evolution, systematics and distribution of fossil mammals, birds and brachiopods of Bulgaria and the world. The department is the national center of archeozoology and paleontology of vertebrates. Stratigraphy of the Late Miocene field Strumiani. Pleistocene birds from Greece. Mezozoic and Neozoic fauna and evolution of the paleo-environment in Bulgaria and in Europe. Late Miocene in Bulgaria: chronology of the continental palaeontological fields and terrestrial deposits and evolution of the paleo-environment. Palaeontological investigations of the field of the latest Neogene Hominoids in Europe - „Azmaka", Chirpan. Climate dynamics and the death of apes in the Late Miocene in Europe. In the palaeontological branch in Asenovgrad, paleontological studies of more than 40 species of Late Miocene mammals and the state of nature of that time are in progress.

Botany
Chorology, systematics, taxonomy, phytogeography, ecology and physiology of plant species in Bulgaria. Flora and vegetation of protected territories. Plants and their habitats in the European cities. Economically important fields of 12 types of Alchemilla - estimation of the reserves and recommendations for their preservation.

NMNH was established In 1889 by the Royal Prince Ferdinand as Natural History Museum. In 1947 It became the first Institution to become part of the BAS system. It has Its present name since 1974.

CLIMATE CHANGES, RISKS AND NATURAL RESOURCES

Geological Institute „Acad. Strashimir Dimitrov" (GI)

1113 Sofia, Acad. G. Bonchev St., Bl. 24;
Tel. (+359 2) 872 35 63, Fax: (+359 2) 872 46 38
E-mail: geolinst@geology.bas.bg
URL: http://**www.geology.bas.bg**

The Geological Institute is the national research and expert scientific organization, which develops the classical geological disciplines and the current priorities in geosciences. The main research activities of the Institute are directed to the study of the geo-environment on the territory of Bulgaria, aiming to support the sustainable development of contemporary society and the safe control of geohazards.
The main research priorities are:
Complex regional geological studies aimed at achieving a state-of-the- art geological knowledge about the territory of Bulgaria, the Balkan Peninsula and the Eastern Mediterranean.
Energy and mineral resources
Geological hazards and protection of the geological environment Environmental geotechnics
Underground waters and geothermal energy - investigation, assessment and preservation.
The activity of the Institute is related to: acquirement of new regional geological data; monitoring of hazardous geological processes (earthquakes, landslides, erosion, abrasion, weak soils); protection and conservation of the water resources of the country; selection of sites for industrial waste; assessment of the geological hazard of terrains for design and construction of railway lines, gas pipelines, important engineering facilities and resort complexes; geotechnical explorations of terrains with complex engineering geological conditions; extension of the mineral/raw material basis of the country; protection and preservation of the geological environment; Preservation, protection and promotion of the national geological heritage. Solutions are proposed to problems of the migration of radionucleides, connected with the design of depositories for low- and medium-radioactive wastes, to problems of seismicity and active tectonics, hydrogeology and karst, regional geological correlations, problems of magmatism and natural resources, environmental protection.

EQUIPMENT

Electron microscopes (SEM JEOL T-300 with EDS-iink for investigation of terrigenic and autogenic minerals, SEM JEOL-SUPERPROBE 733 with microanalyser)
X-ray diffractometer SIEMENS D-500 Automatic laser granulometer MALVERN
Atomic-absorption spectrometer VARIANTECmRON; PERKIN ELMER 3030
X-ray - fluorescent quantometer CPM-25
ICP - atomic-emission spectrometer ULTIMA-2
Digital Guinier chamber for X-ray diffraction analysis Huber G 670
X-ray - fluorescent spectrometer Pikofox
X-ray diffractometer TUR-M-61 and TUR-M-62
Scanning electron microscope with analyzing appliance for work under low and high vacuum Zeiss SEM EVO 25LS, equipped with analytical system EDEX Trident Electrotomographic equipment
Drilling devices and equipment for in situ geotechnical testing (including for stamp testing, SPT, CPTU, etc.)
Laboratory equipment for the investigation of the physical and mechanical properties of rocks and soils

DEPARTMENTS

Geotectonics and Regional Geology
Plate-tectonics, structural geology of magmatic, metamorphic and sedimentary complexes, neotectonics and active tectonics of Bulgaria and the Balkan Peninsula, regional geology. Structure and tectonic evolution of large parts of the pre-Alpine and Alpine tectonic zones and units in Bulgaria. Plate-tectonic models for the development of the region; neotectonics and active tectonics of the Balkans in relation to various geodynamic hazards.

Mineralogy and Mineral Resources
Mineralogy, crystallography of minerals, crystal growth, ores and minerals and wall-rock alterations of ore deposits, metallogeny and mineralogical aspects of geoecology. Monocrystal and powder X-ray investigations, monitoring and measurement of mineral samples and preparations. Solving of ecological problems, related with mining production or with the damages provoked by closed sites of the mining industry.

Geochemistry and Petrology
Petrology and geochemistry of magmatic and metamorphic rocks, magmatic- hydrothermal systems and metasomatic processes related to hydrothermal ore deposits, paleovolcanic activity and the related deposits of non-metallic mineral resources, geology of the environment and coal geology. Age, petrological, geochemical and isotopic characteristics of the Paleogene and Late Cretaceous magmatism in the Rhodopes and the Srednogorie zone; creation of genetic models of magmatism; studies on the origin of zeolites and perlites; isotopic dating; magmatic and hydrothermal systems and metasomatic alterations related to ore mineralizations.

Paleontology, Stratigraphy and Sedimentology
Macro- and micropaleontology, biostratigraphy and sedimentology, covering the entire Phanerozoic; paleoecology, cyclic, event and sequence stratigraphy; microfossil groups: spores and pollen, chitinozoans, acritarchs, calcareous nanoplankton, diatoms, calpionellids, foraminifers, calcareous dynocists,

conodonts and radiolarians. Biostratigraphical studies allow for determination of sedimentary rocks spanning from Paleozoic to Present and are applied in the geological mapping and subsurface search of oil, gas, coal and others. Elemental and mineralogical rock composition, isotopic determinations, diagenetic factors and changes, structures and textures. Geochemical interpretations, macro- and microfacies analysis, paleographic reconstructions, basin analysis and inter-basinal correlations.

Hydrogeology
Regional hydrogeology; groundwater dynamics; hydrogeological modelling and assessment of groundwater resources; hydrochemistry and isotope hydrogeology; ecological problems and groundwater pollution; thermal field of the Earth, thermal water and geothermal energy; monitoring and groundwater regime, hydrogeological prognoses. Pollution and protection of groundwater and the hydroecological risk in Bulgaria. Generalized regional hydrogeological investigations of important regions of the country as the Thracian lowland, the Sofia kettle, the riparian Danubian lowlands, parts of the Moesian Platform.

Geological Hazards and Risks
Landslides, rock-falls, fault movements, slope stability assessment and geohazard mapping; monitoring of geological hazards; monitoring of engineering facilities, cultural and historic monuments, affected by geological hazards. Development and establishment of special programs and projects, aimed to mitigate the geological hazards and the consequences from disastrous events. Expert activity on important sites in the country - hydrotechnical facilities, cultural and historic monuments, the landslides in the Rhodopes, along the Black Sea coast and the Danubian bank. Permanent monitoring of the rock deformations in the vicinity of the „Madara Horseman", and in the region of the epicentral zone of the earthquake of 4 April 1904 (M=7.8) in the Krupnik-Kresna region.

Environmental Geotechnics
Investigation of soft and collapsible soils; development and application of soil improvement techniques; site selection and site characterization for hazardous waste disposal, environmental impact assessment studies, recultivation and reclamation of disturbed terrains; engineering geological and geoenvironmental explorations, investigations and monitoring of sites for large industrial facilities; geotechnical analysis of terrains affected by hazardous geological processes. Loess soils in Bulgaria, development and application of soil improvement techniques. Geotechnical investigation of the wastes from the Thermal Power Plants; development and application of methods for their utilization in construction; site selection and site characterization for low and intermediate level radioactive waste disposal in view of environmental safety; modelling of hazardous chemicals migration in unsaturated media and safety assessment; prognoses of the migration of pollutants in non-saturated medium; analysis and estimation of terrains affected by hazardous geological processes along the North Black Sea coast and zonation depending on the ground construction conditions.

Laboratory of Seismotectonics
Investigation of the seismotectonic conditions and the resulting seismic hazard; development of seismotectonic prognoses and assessments. Models for the youngest tectonic stress fields of the Balkan Peninsula. Paleoseis- mic investigations. Seismic zoning and long-term earthquake provision; recent geodynamics of the Earth's crust; deep structure of the lithosphere according to geophysical and seismological data; tectonic stress fields in the Earth's crust; active faults on the territory of the country; investigations on the seismotectonic conditions for existing or designed industrial facilities - dams, sites of nuclear facilities, gas and oil pipeline systems, bridges, high buildings; tectonics and morphology of the karst terrains; controlling role of the tectonic stress fields for the formation of the main karst galleries directions and the related underground flow; paleoseismological studies in karst terrains; seismic hazard for important cultural and historic monuments.

Geotechnical Research Station - Russe
Lithology, stratigraphy, genesis, paleoclimatic and paleogeographic conditions during the Quaternary in North Bulgaria; geological-geomorphologic investigations on the neotectonics; engineering geological zoning of urbanized territories in loess terrains; geotechnical investigations of deformed buildings, constructed on collapsible loess base; improvement of the loess base by means of injection piles or lime columns; geotechnical monitoring of the geological environment; engineering geological explorations of sites with displayed geological hazard. The station has various equipment for terrain investigations: drilling equipment, inclinometer, plate loading apparatus, dynamic penetrometers, transport vehicles, and laboratory equipment for determination of soil classification and mechanical parameters.

Laboratory of Geocollections
Organization and storage of the geological samples, owned by the Geological Institute. The geocollections contain samples of rocks, minerals and fossils collected in Bulgarian outcrops, mines, borehole cores and sludge. The samples are organized according to a system, which is unique and is used for the first time in the museum practice in Bulgaria. It provides the possibility of collecting full information for the various sample groups, presented in details in a standard scientific passport, stored both in electronic and hard copy form in the card-index of the Laboratory.

Research Geological Laboratory „Geolab"
Testing and analysis of various natural raw materials and technogenous products: minerals and rocks; surface and underground waters; soils; construction materials, non-metallic raw materials; ores, concentrates, wastes, agglomerates, pellets, etc. The Laboratory has one of the best equipment in Bulgaria for determination of the chemical and mineral composition, the physical and mechanical properties of rocks, minerals and soils. „Geolab" is certified to analyze superficial and underground waters and soils.

The Geological Institute was founded in 1947.

National Institute of Geophysics, Geodesy, and Geography (NIGGG)

1113 Sofia, Acad. G. Bonchev St., Bl. 3;
Tel. (+359 2) 979 33 22, Fax: (+359 2) 971 30 05
E-mail: office@geophys.bas.bg
URL: http://**www.niggg.bas.bg**

The National Institute of Geophysics, Geodesy, and Geography carries out fundamental and applied research in the field of geophysics, seismology, seismic engineering, geodesy, and geography in order to facilitate the sustainable development of Bulgaria. The Institute provides scientific services to governmental and non-governmental bodies, including monitoring and expert information, analyses and assessments.
Fields of research: Fundamental scientific investigations of the global patterns, structure, properties, and phenomena in the crust, surface, and envelope of the Earth; Applied investigations of the regional geo-fields and phenomena, which aim at discovering their main characteristics and behavior. Priorities: Development of scientific methods and techniques for research and operational activities, organization and maintenance of an integrated geo-information database.

Monitoring of processes and phenomena, related to natural and anthropogenic risks.
Studies of seismic and anthropogenic risks, current Earth's crust movements, seismic safety of buildings, engineering facilities and infrastructure.
Warning about risk events and formulation of science-based policies for natural and anthropogenic risk management.
Enhancement of the contacts with state, public, and business organizations to implement the obtained scientific results.
Close integration in the European and global research programs and monitoring networks.
Attracting and training young researchers.

Scientific Operational Services:

National Seismological Service
Its network includes 14 stations and observatories and two local networks - „Provadia" and „Kozlodui". The Seismic Centre in Sofia collects, processes, analyzes and interprets the information from the network. This is the only system in Bulgaria which determines in real time the earthquake parameters in the country and the neighboring areas. The operative information is immediately submitted to the Council of Ministers, different ministries, the public, mass media and all other interested institutions. The information is also subject to international seismological information exchange. A 2003 Council of Ministers' Decision established the Institute as the Coordinator of the National Data Centre to the Bulgarian Ministry of External Affairs in connection with the UN Comprehensive Nuclear-Test-Ban Treaty.

National Network of Permanent Global Navigation Satellite System (GNSS) Stations
The Network includes 22 permanent stations, which receive and transfer data in real time over the internet to the GNSS Centre in Sofia for collection, processing and analysis. It conducts the processing and analysis of the 465 point State GPS network, while the results serve the completion of the Bulgarian portion of the European Geodetic Reference System.

National Strong Motion Network
Includes 33 permanent registration accelerometric stations, which are located in the National Seismic network and in engineering structures of various types. A Sofia Centre, which uses GSM technology, collects, processes, and analyzes the data. The information is used for assessment of the seismic risk of urban areas, buildings and facilities.

Geomagnetic Service
Located in „Panagyurishte" Geomagnetic Observatory, the Service maintains the only international geomagnetic standard in the country through conducting absolute and comparative geomagnetic measurements. The Service is a member of INTERMAGNET - the world network of digital geomagnetic observatories. It also operates as a national body for creation and maintenance of the geomagnetic model of Bulgaria. Main consumers of its informational products are the Ministry of Defense' Military-Geographic Service, and the Cadastre Agency of the Ministry of Regional Development and Public Works.

Ionospheric Service
Located in the „Plana" Observatory, this Service conducts recording, processing and analysis of the ionospheric information. On the basis of these observations both short-term and long-term forecasts are issued, concerning the short-wave radio communication conditions on the territory of Bulgaria under a contract with the Ministry of Defense.

The Network for Terrestrial Measurements of Biologically Active Solar Ultraviolet Radiation
The Network uses three stationary devices located in the city of Sofia, the village of Shkorpilovtsi, Varna, and in the Vitosha Mountain. The devices supply hourly information and 24-hour forecast about the level of the biologically active UV radiation, published on the Institute's web site.

Forecasting System for the Levels of the Tropospheric Ozone in the Atmosphere
This completely automated System is based on modern, world-recognized models. It fully uses the national weather forecast and predicts the ambient ozone levels for 48 hours ahead. The System meets the normative European criteria for quality forecasts. The information is updated every 12 hours and presented on the Institute's web site.

Paleomagnetic Laboratory
This unique for Bulgaria laboratory is equipped with modern specialized devices for measuring and analysis of the magnetic qualities of rocks, sediments, soils, and baked-clay archaeological artifacts. It maintains a data base on the magnitude of the ancient magnetic field on Bulgaria's territory for the last 8000 years.

Meteor Radar (EMDR20)
This is the only device of the kind for Central and Eastern Europe. Conducts monitoring of the thermodynamic regime of the mesosphere and the lower stratosphere. Studies the section of the Earth atmosphere which is affected by human activity and the solar activity, which influence radio waves transmission.

DEPARTMENT
Geophysics

Research and scientific-operational activity in the field of Physics of Solid Earth (Earth's magnetism and gravimetry, paleomagnetism and environmental magnetism) and Physics of the Earth's envelope (atmosphere and ionosphere).

Earth Magnetism
Monitoring and analysis of the behavior of Earth's current magnetic field using data from the geomagnetic observatory „Panagyurishte". Interpretation of geomagnetic and gravity anomalies caused by structures in the Earth's crust and upper mantle. Investigation of deep geo-electrical structures using the telluric currents method. Study of the behavior of the ancient magnetic field in the historical past by using archeo-magnetic data and dating. Applied magnetic studies of the environment in order to develop paleo-climatic reconstruction of Bulgaria's territory and assess the degree of anthropogenic pollution of soils and sediments. Studies of anisotropy of rock samples' magnetic susceptibility in solving structural geology problems.

Physics of the Atmosphere
Phase transition of atmospheric water. Atmospheric turbulence and diffusion. Dynamic processes in the atmosphere. Stratospheric ozone and ultraviolet radiation in the atmosphere. Air quality protection, pollution emissions inventories, and forecast models for local, regional, and national air quality.

Physics of the Ionosphere
Investigation of the mechanism of the ionosphere influence on the Earth's atmosphere - its impact on the chemical composition, temperature balance and structure, and irradiative properties. Studies of the middle atmosphere and its relation to climate change. Investigation of the waves in the ionosphere - global distribution and temporal variations of the main tides, stationary planetary waves, and others. Effects of atmospheric dynamics and climate on the ionosphere, with significance for communications and satellite technology.

DEPARTMENT
Seismology

Maintains the flawless continuous functioning of the National Seismological Service: Monitoring of seismicity and analysis of seimogenic processes on the territory of the country and the adjacent areas. Physics of the seismic waves and earthquake mechanisms. Earthquake magnitude classification. Structure of the Earth's crust in Bulgaria. Seismic zoning in the Republic of Bulgaria. Basic applied research results: Seismic zoning maps of Bulgaria; Automated system for assessment of earthquake effects; Detailed macroseismic files, maps and atlases; Seismic maintenance of the Bulgarian nuclear power stations.

DEPARTMENT
Seismic Engineering

Maintains the continuous functioning of the National Strong Motion Network and performs seismic risk assessment of settlements, buildings, and engineering structures: Defining the parameters of the expected seismic effects; Analysis of the dynamic response of the system terrestrial environment-structure-equipment; Probability analysis of the seismic safety of buildings and structures; Investigation, analysis and assessment of the damages from strong earthquakes in the country and abroad; Investigation and assessment of the seismic safety/vulnerability of all types of buildings and engineering structures; Creation of structures, which actively resist seismic excitations; Seismic risk reduction for cultural monuments; Preparation of regulations for design and construction in seismic regions; Preparation of the National parameters for ES8 application in Bulgaria. More important objects of applied research: NPP „Kozlodui" and the NPP „Belene site; Thermal power plant (TPP) „Maritsa-Iztok"; The dams of Chaira, Kardzhali, Draginovo, Tsankov kamak; The Sofia subway; The salt body near Provadia; Monuments of cultural heritage - the Rila Monastery, the church St. Sofia in the city of Sofia, the Bulgarian National Bank buildings in Varna and Plovdiv, the Shumen mosque, the Antique Theater in Plovdiv and others.

DEPARTMENT
Geodesy

Object of investigation is the Earth as a planet: space geodesy; geodetic astronomy; physical and mathematical geodesy; basic geodetic networks; global, regional and local geodynamics; the introduction, updating and use of the national reference coordinate, altitudinal, and gravimetrical systems, as a part of the European and world systems; development of a national data base for geodetic information and methods for its maintenance, updating and integration with other national and international geoinformation systems.

Activities: Maintenance of the National Network of Permanent GNSS stations. Contributes to the construction and maintenance of the basic gravimetric network in Bulgaria. Insures the measurements of the Black Sea level, and the magnetic measurements throughout the country, assigned to BAS under the 2006 Law on Geodesy and Cartography. National Centre for Collection, Processing, and Analysis of Geodetic Data based on the measurements of the state GPS, leveling, and gravimetric networks.

DEPARTMENT
Geography

The department studies spatial changes in nature and society in Bulgaria and provides scientific services to national, regional, and municipal governing bodies. It also investigates the relationships between nature, population, settlements and economy in the geographic space.

Physical Geography
Scientific and expert activity related to the parameters, quality and spacetime characteristics of the natural components (relief, climate, water, soils, plants, and animals) and to landscapes at a national level in the context of global changes. The sustainable development of the territory within the system „man-society", as well as monitoring the impacts, interactions, transformations, and risks to the environment quality.

Economic and Social Geography
General and specific investigations, concerning geographic localization of economic sectors, demographic and other processes by administrative-territorial units, functional, and uniform regions, settlements. Conditions and factors, which influence these processes, as well as human impact on the natural environment. Spatial impacts of trans-border cooperation both among neighboring states, and with the EU partners and their influence on the socio-economic development of the country. Participation of the country in the EU regional programmes and strategies, such as the Danube Strategy. Expert activities, serving national, regional, and local state institutions.

Geographic Information Systems (GIS)
Research projects and GIS applications in geographic investigations, spatial analyses and modelling, development and maintenance of geo- databases at a local, regional, and national level. Cooperation with similar institutions from the country and abroad. The section maintains a GIS center with modern equipment.

NIGGG was founded in 2010 by merging of the Geophysical Institute (founded 1960), the Institute of Geography (founded 1950), the Central Laboratory of Geodesy (founded 1948), and the Central Laboratory of Seismic Mechanics and Seismic Engineering (founded 1982).

National Institute of Meteorology and Hydrology (NIMH)

1784 Sofia, 66, Tsarigradsko shose Blvd,
Tel. (+359 2) 462 45 00, Fax: (+359 2) 988 03 80
E-mail: office@meteo.bg
URL: http://**www.meteo.bg**

The activity of the National Institute of Meteorology and Hydrology combines scientific and applied research in the field of monitoring of atmospheric processes, agrometeorology and hydrology, as well as theoretical, experimental and applied research related to the management, use and protection of water resources. The main activities include:
Performing the function of a National hydrometeorological service in Bulgaria
Consulting and expertise
Implementation of scientific and applied research Training of highly qualified specialists
Research in the field of meteorology, hydrology, agrometeorology, and on the conditions, the physical and the chemical processes in the atmosphere and the hydrosphere
International obligations to the World Meteorological Organization (WMO), EUMETSAT, EUMETNET and other international organizations

Research Priorities:
Validation and optimization of the reference observation networks, development and optimization of the equipment and methods for observation, data processing and interpretation, data transmission.
Assessment of the hydrometeorological (climatic, agroclimatic and water) resources, their variability over the territory of the country and their utilization in different sectors of the national economy.
Improvement of the methods for short- and medium-term forecasts of hydrometeorological processes with application of modern tools. Investigation of atmospheric processes and climate variability, development of methods for long-term weather forecasting.
Cloud physics and aerological studies.
Composition and changes of natural and anthropogenic origin in the atmosphere and hydrosphere at different scales, study and modelling of the pollutant transport processes.
Management and planning of water resources utilization.
Utilization and management of water in river basins.
Management of water resource systems; hydraulic and hydrophysical problems of water systems.

METHODS, TECHNOLOGIES AND EQUIPMENT

Automatic system for meteorological communications „TRANSMET“ - ground-based, „METEOSAT“ - receiving station Radar observations and automatic meteorological stations Low-level radiation laboratory for determining alpha-radionuclides in environmental samples
System for sounding of the troposphere and the lower stratosphere VAISALA

Numerical methods of forecasting the atmospheric processes and the transport of pollutants.
Methods and tools for rational management and usage of water resources

INFORMATION PRODUCTS

Meteorological, climatic, hydrological and agrometeorological information; hydrometeorological expertise and assessments of the resources of renewable energy sources.
Early warning systems in case of natural disasters and industrial accidents in operational mode:
Bulgarian module of the early warning system for hazardous meteorological phenomena (METEOALARM)
System for issuing storm warnings for the Black Sea
Early warning system for floods throughout the country and for the trans-boundary rivers Tundzha and Maritsa
Radar systems for identification of hazardous meteorological phenomena and area measurements of precipitation quantity Early warning system (ERS-V07) in case of nuclear accident with modules to account for the dose loading and radioactive source evolution. Specialized complex expert studies and reports (for Kozloduy and Belene Nuclear Power Plants, Ministry of Regional Development and Public Works).
Specialized hydrometeorological and agrometeorological databases.

DEPARTMENTS

Meteorology
Provision of methodological and technical support and optimization of the meteorological network, measurements and observations in Bulgaria. Climate variability and change, climate resources and their utilization. Analysis of adverse and extreme meteorological phenomena and natural disasters and their influence on different sectors. Introduction of complex climatic parameters for assessment of climate and microclimate, norms and standards for construction projects in civil and power engineering, energetics, museums. Building, management, maintenance and development of the meteorological database. Service to users with meteorological and climatic information products; solving tasks in the field of applied climatology. Maintenance and optimization of the agrometeorological network. Service to the state institutions with agrometeorological information and expert assessments. Numerical modelling and satellite observations for analyzing the processes of plant surface of the Earth. Assessments of the agroclimatic resources and the influence of the climate change on the crops.

Hydrology
Measurement of the main quantitative parameters of the surface and groundwater flow and maintenance of data base. Investigation of the alterations in the runoff on the Bulgarian territory. Preparation of expert hydrological assessments and regional assessments of the water resources. Providing warnings for dangerous events, methods and models for investigations of the rivers and groundwater regime, assessment of extreme hydrological events such as floods and droughts. Introducing of programs for short-term hydrological forecasts. Qualitative assessment and distribution of the river sediments, their changes as a result of natural and anthropogenic factors. Assessment of the morphometric characteristics of the rivers.

Meteorological Forecasts
Issuing seasonal, medium- and short-term forecasts about the weather and sea conditions. Numerical and stochastic modelling of meteorological processes and phenomena, improvement of its quality and reliability. Modelling of climate changes. Providing governmental and public institutions with operational meteorological information. Development and improvement of early warning systems for severe weather phenomena.

Atmospheric Physics and Ecology
Meteorological aspects of air pollution. Atmospheric diffusion models, early warning systems for air pollution. Physical processes in the atmospheric boundary layer, monitoring of atmospheric radioactivity and precipitation, precipitation chemistry. Experimental studies, local and statistical atmospheric models, atmospheric optics and actinometry, atmospheric renewable energy sources. Assessment and analyses of monitoring data, expert opinion and consultancy.

Water Management
Theoretical, experimental and applied research related to the management, usage and protection of water resources. Management and planning of the utilization of water resources; utilization and management of waters in river basins; management of water resource systems; hydraulics and hydrophysics of water systems. Methods for rational planning and management of water systems and facilities, simulation models for river basin water resources utilization, runoff studies, water supply reliability. Development of water and wastewater treatment technologies. Hydraulic operation of hydraulic structures and river flows, the processes of filtration, level control and nitrate pollution of groundwater, hydrometrics, hydroautomation of irrigation and water supply systems. Risk assessment for floods, protection of coasts against abrasion and flooding. Estimates of static and dynamic behaviour, thermal regime and the integrity of hydraulic structures.

SECTORS

Telecommunications
Structure:
Regional and National Telecommunication Centre (RTC)
Networks and Telecommunications Operational and applied research in the field of hydrometeorological telecommunications according to the requirements of WMO. RTC-Sofia is one of the 15 GTS Regional Telecommunication Hubs of the WMO. It provides information about the countries from South-Eastern Europe and the Middle East. RTC-Sofia and the National Telecommunication Centre provide realtime access to the international (over 187 countries) and national hydrometeorological data and products. They are responsible for processing and selective dissemination of daily information from observations, forecasts, aerological, radar, satellite and other information needed in the fields of meteorology, hydrology, agrometeorology, oceanography and ecology. The scientific and applied activity of the sector is related to the development and implementation of advanced information technologies and systems.

Hydrometeorological Instruments and Metrology
Repairing and inspection of meteorological instruments such as hygrometers and hygrographs, thermographs, barometers and barographs, means for measuring the direct solar radiation, measurement of levels and others, used in the network of the NIMH, as well as their calibration and metrological control. The sector is equipped with facilities to create a laminar air flow, a homogeneous air volume with preset values of temperature, humidity and pressure, and appropriate test equipment. The experts in the sector consult the NIMH units about purchase of new measurement tools.
International Affairs

Coordination and control of international contacts, cooperation and joint activities with international organizations. Provides information about the implementation of decisions of various bodies of WMO, submits statements, questionnaires and other materials connected with the activities of international organizations such as WMO, EUMETSAT, ECMWF, IHP-UNESCO, UN, etc. Monitoring of the implementation of signed agreements between NIMH and similar organizations abroad and in the country; keeping up contacts with Bulgarian state institutions; coordination of the participation of employees and teams from NIMH in international programmes and projects.

Educational Centre
Education and training courses for further qualification and specialization of the employees in NIMH, thus improving and enhancing their knowledge and practical skills. Collaboration with the NIMH staff in the organization of national and international workshops and seminars. Organization of practices and visits of graduate and undergraduate students and scholars and popularization of the NIMH activity in collaboration with national education institutions.

BRANCHES NIMH - Plovdiv

4000 Plovdiv
139, Ruski Blvd.

Maintenance of a network of 9 synoptic, 29 climatological, 77 precipitation, 8 agrometeorological, 17 agrophenological, 62 hydrological, 107 hydrogeological stations and points in South Bulgaria. Observation of radiation in 13 points and chemical air pollution with PH of the rainfalls in 12 points. Maintenance of 31 automatic meteorological and 19 automatic hydrological stations, as well as early warning systems for floods with five-days forecasts for the level of Maritsa and Tundzha rivers and forecast for the afflux of the Rodophes' dam lakes. There are two laboratories: an accredited laboratory for radiation control - ISO 17025:2006, for waters, air, soils, construction materials, alimentary and animal products, and a laboratory for determination of the icing activity of pyrotechnical components for hail suppression.

NIMH - Varna

9005 Varna
10, Sveti Nikola St.

Regular meteorological, hydrological and agrometeorological observations over 8 administrative areas in Eastern Bulgaria. The network consists of 8 observatories and includes 13 synoptic, 23 climatological, 53 precipitation stations, 11 agrometeorological, 23 agrophenological, 19 hydrological, 87 hydrogeological and 2 marine weather stations. The branch has laboratories for determination of the air and water content as well as radiometric data. It maintains databases and a telecommunication center of its own. The Branch produces meteorological and hydrological forecasts, specialized forecasts for the needs of agriculture; short- and medium-term meteorological forecasts for the economics - transport, tourism, building industry. According to international agreements, the brunch issues regular forecasts and wind warnings for the Bulgarian shipping; twice daily it issues meteorological forecasts for JULIETTE region in the Black Sea in the frame of the NAVTEX program.

NIMH - Pleven

5800 Pleven
60, Hadzhi Dimitur St.

Management of the observation network, servicing the regions of Northern, Central and North-west Bulgaria with agro- and hydrometeorological information. Control and collection of data. Maintenance of 5 observatories, 7 synoptic, 19 climatological, 56 precipitation, 7 agrometeorological, 45 hydrological and 14 hydrogeological stations. The Branch performs regular synoptic, climatic, agrometeorological and precipitation observations, measurements of the capacity of the springs and surface waters. It produces short-term, medium-term and specialized forecasts. The Branch also maintains laboratory for radiation control and chemical laboratory, performs technical support of local computer networks, software, adaptation and maintenance of the software products in all fields of its activity.

NIMH - Kyustendil

2500 Kyustendil
Dupnishko shose, St., P.O.B. 79

Maintenance of meteorological, agrometeorological, hydrological and hydrogeological networks of stations and points in Southwest Bulgaria: 192 stations and points, distributed in 4 synoptic and 19 climatological stations, 58 precipitation points, 43 hydrological, 49 hydrogeological and 19 agrometeorological stations and points. Provision of regular meteorological, agrometeorological and hydrological information; information about the chemical and radioactive pollution; short-term, medium-term and monthly meteorological and hydrological forecasts, as well as forecasts about crops development and yield. Assessments and studies of the meteorological and hydrological phenomena and climate changes.

Institute of Oceanology „Prof. Fridtjof Nansen“

9000 Varna, P.O.B 152,40, Parvi mai St.,
Tel. (+359 52) 37 04 84, Fax: (+359 52) 37 04 83
E-mail: office@io-bas.bg
URL: http://**www.io-bas.bg/**

The Institute of Oceanology is a marine research center for studying the problems of the Black Sea in accordance with the national and European priorities. The research activities of the Institute are in the field of marine physics, chemistry, geology and archaeology, marine biology and ecology, coastal dynamics and ocean technologies. It carries out complex monitoring of the Bulgarian part of the Black Sea, performs consulting and expert activities and implementation of the scientific results, and prepares qualified marine scientists. IO represents BAS as a co-ordinator of all studies related to the Black Sea and World

Ocean by the National Oceanographic Commission (NOC) and successfully directs the research activity and international relations within the frame of the Intergovernmental Oceanographic Commission (IOC) of UNESCO. In 2005 a National Centre for Oceanographic Data was established at the Institute, which is included in the system of center of the International Oceanographic Data Exchange (IODE) committee of IOC.

EQUIPMENT AND FACILITIES

Research ship „AKADEMIK", certified to conduct cruises in the Black Sea and the World Ocean with a mini-submarine PC-8. The ship is equipped with echo-sounder SIMRAD-EK60 and operating research fishing gear - two pelagic trawls and two demercal bottom trawls.
A research base includes research laboratories, auditorium and a ramp, for multipurpose studies of air-sea-land-technosphere interaction in the coastal zone under conditions of tideless sea
Multibeam echo-sounder for designing bathymetric charts.
Laboratory „Molecular taxonomy and ecology of marine organisms" for genetic analyses for studying the population-genetic structure of marine hydrobionts.

DEPARTMENTS

Marine Physics
Measurements and analysis of the main hydrophysical parameters of sea water and the meteorological components of the adjacent atmosphere. Experimental study on the dynamics of sea currents and turbulent diffusion and exchange under the conditions of the Bulgarian shelf zone. Methods for numerical diagnosis and prediction of sea currents and processes of dynamical distribution and spreading of suspended matter in marine environment in the Black Sea and other regions of the World Ocean.

Marine Chemistry
Monitoring of the main chemical parameters - main ions, dissolved gases, biogenic elements in the western part of the Black Sea and coastal lakes; Study of the features of the vertical hydro-chemical structure of the Black Sea, including the zone of change in oxidizing-reduction conditions; Anthropogenic impact on the quality of the coastal waters and sediments; Processes in the marine environment and contact zones ,,air-water" and „water-sediments"; Relations in the system river-sea; Introduction of the European Water Framework Directive in Bulgaria.

Marine Biology and Ecology
Taxonomic and functional biodiversity of the Black Sea ecosystem and the food chain interactions; Response of biota to external factors - anthropogenic pressure and global climatic impact. Guidelines for monitoring and laboratory analysis of Black Sea flora and fauna and ecological quality classification standards for biological quality elements in accordance with the implementation of the Water Framework Directive in Bulgaria. Assessment of the ecological quality of waters and the commercially important fish stock along the Bulgarian coast.

Coastal Zone Dynamics
Wind-wave climate and wave transformation in shallow water; wind-wave structure and non-linear relations; sea level fluctuations; coastal morpho - and

lythodynamic processes; sediment balance; geodynamic coastal processes. Assessment of the impact of the hydrotechnical structures on the coastal dynamics, sediment transport and deformation of the underwater coastal slope; modelling of coastal dynamic processes.

Marine Geology and Archaeology
Lithology, stratigraphy of the sediments sequences; geomorphology of geological structures in the western part of the Black Sea; transgressive-regressive cycles of the Quaternary evolution of the basin; rate and specifics of the recent lithogenetic processes on the continental shelf, slope and deep zone. Climatic and sea level changes, the reconstruction of the palaeogeographic conditions during the Quaternary. Geophysical fields, raw minerals and alternative energy resources in the Bulgarian part of the basin. Economical exploitation of the water area, applying contemporary knowledge of the geological and geomorphological structures of the sea bottom. Coastal zone and underwater archaeological landscapes.

Ocean Technologies
Processes and phenomena in the system „man-technical devices-marine environment". Technologies and equipment for marine investigations; Technologies and training for implementation of the diving method as an instrument for in situ observations of the underwater environment. Technical and technological support for the research activities of the Institute. Acquisition, processing, quality control, publishing and exchange of oceanographic data.

IO was founded in 1973.

ASTRONOMY. SPACE RESEARCH AND TECHNOLOGIES

Institute of Astronomy with National Astronomical Observatory (IA NAO)

1784 Sofia, 72, Tsarigradsko chose Blvd.,
Tel.,/Fax: (+359 2) 974 19 10,
E-mail: office@astro.bas.bg
URL: https://**www.astro.bas.bg**
https://**www.nao-rozhen.org**

The Institute of Astronomy with National Astronomical Observatory carries out fundamental research and education of specialists and graduate students in astronomy and astrophysics. The Institute operates two modern observatories for astronomical observations and research - The National Astronomical Observatory (NAO)-Rozhen and Astronomical Observatory (AO) in Belogradchik. The observatories are places for practical training of students in astronomy from the universities of Sofia and Shumen.
NAO Rozhen is located at 1 750 meters altitude in the Rhodope Mountains about 25 km from the city of Smolyan. This is a modern base for astronomical research, equipped with four telescopes for optical observations. The main telescope of NAO Rozhen is a two-meter reflector, optical system Ritchey-Chrdtien-CoudCi, produced by the German company Carl- Zeiss, Jena. In the Ritchey focus direct images for photometric studies of comets, asteroids, stars, stellar

clusters, nebulae, galaxies and quasars can be received. In the Coudii focus (F/36) high disspersion spectra can be obtained using 3 different cameras: 18 E / mm, 9 E / mm and 4 E / mm. The spectral resolution reaches 35 000, and the accuracy of the measured radial velocity is better than 1 km/s. The other two optical telescopes of NAO Rozhen are specialized for photometric observations. The relatively big field of observation makes these telescopes suitable for photography of large areas of the sky in order to study fast-moving objects - asteroids and comets, variable stars of different classes, to search for exoplanets, Novae stars in the nearby galaxies. Since 2005 NAO Rozhen operates a 15 cm Lyot-coronagraph developed and built at the Institute of Astronomy and mounted in the solar dome. The Lyot-coronagraph is used for investigation of active processes and prominences in the solar corona under conditions similar to total sollar eclipses.
The second observing facility of the Institute - AO Belogradchik is equipped with a reflector which can be operated in two modes: with an automatic electrophotometer, connected to a computer for recording and data processing, and a mode of direct imaging with a CCD camera FLI PL 9000. The main observational programs include asteroids, variable stars, star clusters, galaxies and quasars.

EQUIPMENT

Two-channel focal reducer (F/2.8), two CCD cameras - Photometries AT200 and VersArray 1300B, cooled with liquid nitrogen.
Two telescopes with mirror diameter 60 cm, Cassegrain system Telescope, Schmidt system, with mirror diameter 70 cm and correction lens with diameter 50 cm.
The telescopes are equipped with state of the art CCD cameras: FLI PL 9000 for the Cassegrain telescope and FLI PL 16803 for the Schmidt telescope.

DEPARTMENTS

Sun and Solar System
Processes in the Solar atmosphere leading to the appearance of active structures - prominences and spots. Participation in the European organization for joint observations of the Sun (JOSO) and in programs for coordinated ground-based and orbital observations of the Sun in the framework of the project SOHO. Dynamic evolution of small bodies in the Solar system, physical and chemical properties and processes in comets, rotational characteristics of asteroids. Photometric observations and positional measurements of asteroids and comets.

Stars and Stellar Systems
Stars and the systems they build, processes, phenomena and physical laws that characterize the key phases of stellar evolution; physical characteristics of hot, massive, high luminosity stars and the dynamical parameters of stellar winds; chemical composition of stellar atmospheres and its variations due to the influence of circumstellar matter or tidal interactions in binary systems; processes of mass transfer, formation and development of accretion discs in close binary systems with compact component; dynamics and physical characteristics of sub-stellar systems - objects with extremely low luminosity, exoplanets and exoplanetary systems; characteristics of stellar activity in stars and stellar systems typical for early stages of stellar evolution; manifestation of stellar magnetism and the role of stellar magnetic fields in processes that feature the late stages of stellar evolution.

Galaxies and Cosmology
Physical processes and chemical abundance in galaxies and systems of galaxies. Photometry and Surface photometry of normal and active galaxies. Structures of galaxies and clusters of galaxies, VOIDs, catalogs of the most massive structures and their large-scale distribution in the Universe. Primordial

nucleosynthesis and chemical evolution of the light elements. Neutrino oscillations and cosmological constraints. Baryogenesis scenarios and possibilities of antimatter in the Universe.

Laboratory of Astroinformatics and Virtual Observatory
A database for wide astronomical photographic observations (http://sky- archive.org). Bulgarian Virtual Observatory and Bulgarian GRID computer network and its astronomical applications. Preparation of handbooks and reference books on using the Virtual Observatory, the GRID computer network and the database reference tools.

IA NAO was founded in 1995 as a successor to the Section of Astronomy with National Astronomical Observatory of BAS.

Space and Solar- Terrestrial Research Institute (SSTRI)

1000 Sofia, Acad. G. Bonchev St., Bl. 1
Tel. (+359 2) 988 35 03, Fax: (+359 2) 986 16 83,
E-mail: office@space.bas.bg
URL: http://**www.space.bas.bg**

The Institute of Space and Solar-Terrestrial Research is among the leading multi-disciplinary research institutes of BAS in the following scientific areas: space physics, remote sensing of the Earth and planets, and aerospace systems and technologies. The investigations are focused on: solar-terrestrial and space physics (solar wind, magnetosphere-ionosphere physics, high and middle atmosphere physics, space weather); high-energy astrophysics, galactic cosmic rays; medico-biological studies, space biotechnologies, heliobiology, telemedicine; design, development and transfer of methods and technologies for remote sensing of the Earth, regional and global monitoring of the environment; obtaining and application of new superhard materials; innovative aerospace instrumentation and technologies and their industrial transfer.

DEPARTMENTS

Astrophysics and Space Dynamics
Modern methods of nonlinear physics for studying astrophysical phenomena. Structure and nonlinear evolution of astrophysical discs. Physics of shocks in astrophysical objects. Chaotic and synergetic processes in nonlinear systems.

Space Physics
Physical processes In space plasma and planetary atmosphere and interaction of the upper atmosphere with the interplanetary medium. Investigation of plasma structures and their dynamics in the near-Earth environment depending on the impact of solar-terrestrial relationships through analysis of data from satellite and rocket experiments.

Solar-Terrestrial Physics
Radiation environment in the heliosphere; heliobiology and solar influences on biological objects; the magnetosphere as a medium for energy transfer and particle acceleration; possibilities for wide application of electronic health care.

Space Weather
Estimation of the long-term variations of the solar activity and the solar dynamo parameters; physical mechanisms of the influence of the long-term variations of solar activity on the near-Earth space, various atmospheric layers, regional and global climate, development and elaboration of instruments and specialized software.

Space Geophysics and Space Weather Prediction Centre (SWPC)
Development of physical, operational and forecasting models for space weather and space climate considering the respective ionization, electromagnetic and chemical mechanisms of the processes in space geophysics and solar-terrestrial physics. Short-term and medium-term forecast of the solar and geomagnetic activity: disturbances, storms etc. Warnings, alerts and detailed analysis of conditions in the Earth's environment and in space.

Remote Sensing and GIS
Development, improvement, and transfer of methods for environmental studies with integrated use of Earth observation technologies, geoinformation systems and ground-based methods, training of PhD students, MSc students and specialists in the field.

Remote Sensing Systems
Remote investigation of the Earth and the solar system planets. Design and implementation of precise multi-channel spectrometric systems and methods, design of geoinformation systems and automatic processing of data and images received by space and airborne platforms. In-situ validation of experiments and thematic interpretation for industrial implementation.

Aerospace Information
Design construction and exploitation of onboard and ground-based automated systems for receiving and processing of aerospace information.

Aerospace Instrumentation and Technologies
Design and transfer of aerospace instrumentation and technologies in the field of space communication and navigation, control systems and diagnostic systems for human psycho-physiological status under extreme conditions.

Aerospace Control Systems
Development and investigation of computerized control systems with aerospace application. Development of methods and tools for study of human operator as an element for aerospace ergatic systems.

Space Biotechnologies
Development of plant growth facilities and new technologies for growing plants in weightlessness.

Space Material Science
Synthesis and investigation of new materials and development of novel technologies for aerospace and industrial application.

„Observatory" - Stara Zagora
The unites „Observatory" and „Cosmos" Ltd. develops scientific and applied investigations in the field of solar-terrestrial physics. Specialized devices and software for spectrophotometric investigations are designed and produced.
„Cosmos" Ltd.

Optical Investigations of the Atmosphere
Dynamic and chemical processes in the high and middle Earth atmosphere. Minor gas components and total ozone content. Influence of the solar activity on the dynamic content of the middle atmosphere and climatic changes. Atmospheric absorption and auroral phenomena in the polar oval region.
Laboratory „Optical Systems"

TRANSFER AND PRODUCTION

Technology Transfer Centre
Consulting services related to transfer of technology, innovation and knowhow, preparation, consultation and coordination of projects, international cooperation, training activities and scientific meetings.

TAKT IKI Ltd.
The company is registered under the Trade Low and is owned by SSTRI. It was created to implement contracts in aerospace technology and application.

CLUSTER KAKTIP
Non-profit organization, which includes universities, companies, research institutes of BAS and the Agricultural Academy, contributing to the development of research and innovation in the field of aerospace technology and their industrial application.

SSTRI was founded in 2010 by merging of the Space Research Institute (founded in 1975 as a Central Laboratory for Space Research) and the Institute of Solar-Terrestrial Influences (founded 1990).

Institute for Bulgarian Language „Prof. Lyubomir Andreychin“ (IBL)

1113Sofia, Shipchenski prohod Blvd., Bl. 17
Tel./Fax: (+ 359 2) 872 23 02
E-mail: ibe@ibl.bas.bg
URL: http://**mvw.ibl.bas.bg**

The Institute for Bulgarian Language is one of the oldest institutes of BAS. It is the main center for scholarly research in and description of the Bulgarian language focusing on its contemporary state, history, dialectal diversity and interaction with other languages. The Institute is a coordinating unit responsible for determining the Bulgarian national language policy and maintaining connections with Bulgarian study centers abroad. The activities of the Institute are aimed at:
Organization and carrying out of fundamental and applied research in accordance with the national interests and the current world tendencies, assistance in the application of the scholarly results achieved at IBL by other institutions in the Republic of Bulgaria.
Study of Bulgarian language, history, culture, and social system and the national contributions to the world civilization.
Conducting of research and expert activity under international, national and regional projects and programs.
Elaboration of prognoses, projects and programs for the development of the country
Publication of scientific materials and their dissemination
Creation, preservation and dissemination of scholarly data and results, collections and objects of national significance.
A result of the theoretical and applied investigations on the Bulgarian language are the following works: grammar books (on phonetics and phonology, morphology and syntax, semantics and pragmatics); dictionaries (monolingual, bilingual, syntax, etymological, historical, orthographic, dictionaries of idioms, dialects, dictionaries of Old Bulgarian, etc); atlases of the Bulgarian dialects, lexical-semantic networks (WordNet), corpora (monolingual, multilingual, annotated, parallel) and others. The Institute is committed to the preservation of the linguistic diversity and the national language richness. The Institute defends the interests of Bulgaria with respect to language equality and national identity.

DEPARTMENTS

Modern Bulgarian Language
Research on the history and grammatical system of Modern Standard Bulgarian, and codification of standard spelling and pronunciation; language consultations center.

Bulgarian Lexicology and Lexicography
Compilation of various types of dictionaries on Bulgarian language; expert center on Bulgarian lexicology and lexicography.

History of Bulgarian Language
Research in the domain of the history of Bulgarian language graphic system, phonetics, phonology, morphology, syntax, and semantics.
Bulgarian Dialectology and Linguistic Geography
Complex study of the Bulgarian dialects spoken on the territory of Bulgaria and outside the country's borders at all language levels.

Bulgarian Etymology
Research on the origin of words and word forms in the Bulgarian language and the linguistic relations with other languages and national cultures.

Computational Linguistics
Construction of electronic language resources in Bulgarian; expert center on natural language processing of Bulgarian language.

General and Applied Linguistics
Theoretical and applied issues in sociolinguistics, psycholinguistics, and the philosophy of language.

Comparative Research of Bulgarian and Other Languages
Theoretical and applied comparative studies at different language levels, including a special focus on the processes concerning the European integration of Bulgaria.

Bulgarian Terminology and Terminography
Compilation of terminological dictionaries in Bulgarian; expert center on Bulgarian terminology.

Ethnolinguistics
Important phenomena of the traditional Bulgarian culture, their linguistic forms and cultural semantics.

Applied Onomastics
Research on onomastic issues and standardization of names in Bulgaria, providing assistance to different State and public institutions.

Bulgarian Language Information Centre
The only specialized linguistics library in the country engaged in compiling a complete bibliography of all studies in linguistics published in Bulgaria.

IBL was founded in 1942 as the Bulgarian Dictionary Service and was transformed into an institute in 1949.

Institute for Literature (IL)

1113Sofia, 52, Shipchenski prohod Blvd. Bl. 17
Tei./Fax: (+359 2) 971 70 56
E-mail: director@ilit.bas.bg
URL: http://**www.ilit.bas.bg**

The Institute for Literature is a national center for theoretical, historical, cultural and comparative studies of the Bulgarian literature from the Middle Ages to the present day. The Institute's main task is to analyze, preserve and popularize the Bulgarian literary and cultural heritage and its modern developments in the context of the European traditions in the humanities. The following fields of work are covered:
academic studies in literary theory and history monographs on the works of the Bulgarian writers encyclopaedias and reference books research of mediaeval manuscripts creation of electronic databases and digital libraries research, preservation and publication of archives and archive materials
academic editions of Bulgarian writers in many volumes
The priority research areas are: Old Bulgarian Literature, Bulgarian Renaissance Literature, Modern and Contemporary Bulgarian Literature, Theory of Literature, Comparative Literary Studies, Russian Literature. The Institute carries out methodological, comparative and interdisciplinary investigations, as well as research in general literary theory. The research projects are of great importance for the preservation of the national cultural heritage, the national identity and intellectual values. The four-volume Cyril and Methodius Encyclopaedia, which is unique in the Paleoslavonic studies, has been compiled. The „Periodicals and Literature" series is a unique reference book, which presents the Bulgarian literature and culture through the prism of the press. The „History of the Reception of Translations from European Literature in Bulgaria" is an important creative initiative, a series in many volumes of articles, written by a large number of scholars. Repertorium workstation, a computer infrastructure for the description of mediaeval Slavonic manuscripts http://**clover.slavic.pitt.edu:8080/exist/mss/index.xml**, has been created. There is also a web portal for writings in the Balkans during the Middle Ages: http://**slovo-aso.cl.bas.bg**.
In the field of literary methodology, the following topics are covered: narratology, prosody, the theory of genres and literary semiotics. The typological and contactological relations of Bulgarian literature with foreign literatures and cultures are being developed.

METHODS

Data processing and digital analysis of mediaeval manuscripts Archeographic, palaeographic and textual analysis of the Old Bulgarian literary heritage
Studies in the history of Bulgarian literature
Introduction and application of new theoretical approaches to literature (poetics and semiotics)
Cultural and comparative analysis of literature

DEPARTMENTS

Old Bulgarian Literature
Theory and history of the mediaeval Bulgarian literature; Byzantine-Slavonic literary relations; relations of the Old Bulgarian literature with other Slavonic and Balkan literatures; the study of the work of Cyril and Methodius; Christian hagiography and hagiology (Slavica Sanctorum); Old Bulgarian hymnography;

studies of different types of literary sources from the perspective of codicology, textual analysis, typology and literary history; computer processing of mediaeval Slavonic manuscripts; electronic database of Old Bulgarian literature; electronic database of Old Bulgarian monuments; digital libraries; cultural phenomena of the Black Sea region and the Mediterranean.

Bulgarian Revival Literature
Research of the literary phenomena and cultural processes during the Bulgarian Renaissance (from the 17th c. to the 19th c.), revealing their specific features: authors and their works (poetry, prose and drama), periodicals, cultural centers and literary circles in Bulgaria and abroad; the specifics of genre dynamics, issues of poetics and the peculiarities of reception; calendars, letters and collections of letters; translated literature; stereotypes; emotions and cultural standards; national mythology and national literature; books and sponsors; reference books.

Modern and Contemporary Bulgarian Literature
Study of facts from Bulgarian literary history and their modern interpretation. Individuals, phenomena, literary trends and circles - development, analysis and systematization in the context of cultural history. The Bulgarian literature from the Liberation of Bulgaria from Ottoman Rule to the present day is studied in works of literary history, systematized in different encyclopedias and volumes of scholarly articles. The projects carried out by the department change the traditional perceptions of literary history and the modern literary process, broaden the interdisciplinary relations of Bulgarian literature with the rest of the humanities.

Theory of Literature
The role of literature in developing the cultural identity and the values of society and the individual; literary studies in the context of the humanities in the 21st c. - opportunities and challenges; modern views on the author-text-literary work triad; concepts in literary theory; poetics; narratology; contemporary issues of genre theory; interdisciplinary collaboration of sociological, anthropological, cognitive, semiotic and other approaches to literary research; literature and philosophy; literature and rhetoric; literature and other arts; literature and education; knowledge and self-knowledge in literary studies.

Comparative Studies
Issues of comparative literary studies, as well as history and criticism of translated fiction aiming to place the Bulgarian literature and culture in an international context and to establish its typological relations. The reception of the translations from European literatures in Bulgaria in the 19th c. and 20th c.. Theory, history and criticism of translated fiction. History (11th c. and 21th c.) and poetics of Russian literature; culture and literature of the Russian immigrants to Bulgaria (1920-1944); history of the Bulgarian-Russian literary relations; Bulgarian-Russian comparative literary studies.

Studies of Literary Sources
Search, studies and publishing of the manuscripts of Bulgarian writers. Compiling of catalogues and inventories of the archives of Bulgarian writers, compiling and editing of memoirs and chronicles.

Library
A total of 115 614 books and periodicals in the fields of fiction, literary studies and the humanities in 15 languages. Electronic database for readers' use.

IL was founded in 1948.

Institute for Balkan Studies with Centre of Thracology „Prof. Alexander Fol“ (IBSCT)

1000 Sofia, 45, Moskovska Str.
Tel./Fax: (+359 2) 980 62 97
E-mail: balkani@cl.bas.bg
URL: htpp://www.balkanstudies.bg

1000 Sofia, 13, Moskovska Str.
TeL/Fax: (+359 2) 981 58 53
E-mail: thracologia@abv.bg
URL: htpp://www.thracologia.org

The Institute for Balkan Studies with Centre of Thracology investigates the social, economic, political and cultural development of Balkan nations within the context of European and world history throughout a vast time range - since low antiquity to modern times. The interdisciplinary research carried out by the Institute on the history and the modern developments in Southeastern Europe and their comparative models place the priorities on both the Bulgarian state and society and Europe, in the context of a dynamic EU integration which spreads to the countries in the region. The scientific interest covers topics related to Thracian, Byzantine and Oriental studies, Balkan culturology and European studies as a major vector highlighting the idea of unified Europe and its consolidation. Through its investigation and education activities, the Institute aims to succeed in giving a valuable contribution to a wider comparative platform and to an actualized methodology for the study of the region's history taking into account the Southeastern Europe's ethnic and cultural diversity. The IBSCT has closely committed itself to cooperate with other state institutions, such as the Diplomatic Institute and the National Cultural Institute within the Ministry of Foreign Affairs of the Republic of Bulgaria, the G. S. Rakovski Military Academy and the Ministry of Culture whereby the researchers of the Centre of Thracology take part as experts. The libraries of IBSCT are specialized in a variety of themes and dispose of the largest collection of books, journals, guide-books and microfilms on history, culture, literature, ethnography, politology, ethnic psychology and linguistic studies of the Balkan peoples. They are of great help to scholars, university professors and doctors, post-graduates and students from Bulgaria and foreign countries. They carry out an exchange of books with more than 20 research centers and libraries in Bulgaria and abroad.

EQUIPMENT AND METHODS

Research equipment and devices specialized for 3D open air artifacts; up-to-date equipment for diving and underwater research; diving devices for underwater archaeological excavations; proton gradientometric searching system for the archaeology.
The methods of research are characterized by their complexity, interdisciplinary nature, stratification of the data and findings of any kind, comparative and typological analysis.

DEPARTMENTS

The Medieval Balkans
Ethnical processes in the Balkan peninsula during the Middle Ages; Byzance, the Balkans and the West; Balkan cultures in the Middle Ages; Setting up of the Eastern Orthodox ecclesiastical model; Issues of the historic geography and cartography of the Balkans; The Turnovo literary school; Balkan areal linguistics; Balkan ethnolinguistics. Bulgarian - Romanian, and Bulgarian - Greek linguistic interaction, the Old Bulgarian language, and the History of the Balkan literary languages.

The Balkans in the 15th through the 19th Century
Social and economic history of the Balkans during the Ottoman period; Comparative studies on the legal and economic institutions of the Balkan nations; Cultural processes, institutions and phenomena in the 15th-19th century Balkans; National liberation movements in the Balkans; The Balkans in the international relations of 18th-19th century and the rise of the Eastern question; The concept of „otherness" in the Balkans - a study of Ottoman, Greek and Hebrew sources (documentary and narrative) on the history of Balkan peoples.

The Balkans from 1878 till 1945
Social and economic development of the Balkans; The National question and the national liberation movements; Ethnoreligious and minority problems; Political elites and social history; International relations; Southeastern Europe in the process of transformation and integration; History of town life; History of technology and communications; State and political developments; Modern dimensions of historical heritage.

The Balkans after World War II
Social, political and economic developments in the Balkan countries after WW II; Actual issues of the foreign and home policy of the various Balkan nations; Inter-Balkan political relations in modern times; Interaction between the Balkan states and the European structures; Specific aspects of the main trends of the European policy towards the Balkans.

Cultural History of the Balkan Nations
History of the Balkan cultures and literatures in the 15th-21th century; Cultural processes, socio-cultural structure and intellectual elites of the Balkans; Cultural identities and cultural contact areas; Cultural heritage of the Balkans; Cultural communication and interaction (the Balkans and the Mediterranean area, Western and Southeastern Europe); Modernity and traditions in the Balkans; Ethnocultural strata and civilization models; Receptiveness and translation; Cultural and educational policies; Arts in the Balkans nowadays (cinema, theater, visual arts).

Prof. Alexander Fol Centre of Thracology
Interdisciplinary studies on the ancient history, the language and culture of the Thracians; The Thracian state: political, economic and social aspects of its development; The Thracians in the context of Palaeo-Balkan studies and their cultural communication with pre-Greek components in the ancient cultural space of the Balkans and Western Asia Minor; Thracian society, customs, religion and ritualism; Studies on the linguistic remnants of ancient Thrace, preserved in text of ancient Greek and Roman authors, and in epigraphic monuments; Studies on the fortunes of the Thracian people in late antiquity, their assimilation by the Slavs, and their infusion into the Bulgarian nationality. All key research trends of the Centre make up a complex of complimentary aspects.

IBSCT was founded in 2010 through merging of the Institute for Balkan Studies (founded 1964) and Centre of Thracology (founded as an Institute in 1972 and transformed into a Centre, in 2007).

Institute of Ethnology and Folklore Studies with Ethnographic Museum (IEFSEM)

1000 Sofia, 6 A, Moskovska St.
Tel. (+359 2) 805 26 13, Fax: (+359 2) 805 26 11
URL: http://**hs41.iccs.bas.bg**

1330 Sofia, Acad. G. Bonchev St., Bl. 6
Tel. (+359 2) 979 30 11, Fax: (+359 2) 870 42 09
E-mail: folklore@bas.bg

The Institute of Ethnology and Folklore Studies with Ethnographic Museum combines the best traditions of the two units it comprises. It is an interdisciplinary institute with highly qualified historians-ethnologists, philologists-folklorists and anthropologists, musicologists, historians of arts, museologists and historians of culture. They are engaged in research, education and applied activity, in accordance with the main objective of the European Research Area- to transform EU into a knowledge-based society, the thematic, areal and chronological scope of the research carried out at the Institute is very broad and is connected with the historic and cultural heritage, traditional culture, memory, national and European identities, as well as with the dynamics, mobility and diversity of the changing modern world. The research space includes Bulgaria and the post-Socialist area, the Balkans, the Mediterranean, the Baltic states, USA, Latin America, the Middle East and East Asia.

EQUIPMENT

Restoration and Conservation Workshop
Two Libraries with more than 31 000 book volumes (including 500 volumes from the Royal Library), periodicals and reference books

DEPARTMENTS

Historical Ethnology
Study of the cultural and historical heritage of the Bulgarian people, the historical processes and dynamics of the development of their culture, and the relations and interactions between the Bulgarians and other communities and groups within and outside the country. The achievements are presented in the series „Ethnographic Problems of the Folk Culture“ and „Ethnographic Studies of Bulgaria”.

Balkan Ethnology
Research on the historical heritage and contemporary dimensions of the ethno-culture of the Balkan people with main topics: borders and identities; migrations and mobility; tradition and modernity; nations and minorities. Publishing of: the refereed series Academica Balkanica; the series of monographic works Biblioteca Balkanica and others.

Ethnology of Socialism and Postsocialism
Everyday culture, family and kinship, relations between generations and genders in the socialist and post-socialist period, current ethnic processes: state and development of different ethnic groups and communities in Bulgaria and abroad (Gagauzi, Bulgarian migrants in Bessarabia, Greeks, Armenians, Jews, Karakachans); European integration and the related cultural changes: national identity construction, culture of memory; urban culture diachronic and synchronic studies.

Comparative Folklore Studies
Cultural traditions, social phenomena and processes, typical of different communities and groups (ethnic, religious, etc.) in Bulgaria and abroad (the Balkans, Eastern and Central Europe, the Baltics): dynamics of identities and ethnic/religious interrelations; comparative Slavic studies; comparative religious studies and new religious movements; social and cultural integration and adaptation of groups with special needs, etc.

Anthropology of Verbal Traditions
The verbal forms and traditions as cultural heritage: traditional genre forms, their uses, transformations, application and adaptation to contemporary conditions; verbal forms in contemporary everyday culture. Ethnic, religious, local, migrant, professional and other communities, of informal (youth) groups of interests, of the Bulgarian diaspora abroad and the population in borderline regions. Fields of interest: narration as a cultural and communicative activity; interaction of oral and written traditions; religiosity as experience and expression; local and regional verbal traditions; cultural memory; narration and identity; verbal traditions and contemporary media culture.

Ethnomusicology
Archaic musical and dance forms with their symbolic and mythological nature, the vocal and instrumental music in folk rituals, reconstruction of performance patterns in folk musical and dance culture, the transformations in traditional music and dance in the modern and globalized world. Digitalization of folk music and dance and exposure of Bulgarian folklore heritage on the Internet.

Anthropology of Folk Arts and Visual Forms
Anthropological approach is applied to folk arts, typical of the traditional culture of the village. Application of traditional folk and religious arts in structuring and maintaining the cultural memory and national identity. Contemporary - mainly urban - phenomena and visual forms.

Ethnographic Museum (EM)
The Museum traces, stores, processes, popularizes and introduces to the public ethnographic values, linked to the national and European culture. EM has 13 museum funds with more than 50 000 museum objects (fabrics, embroideries, carpets, costumes, jewelry, pottery, wood-carvings, wrought copper, ritual art, icons and musical instruments). Part of them are representative of the culture of Bulgarians now living beyond the political frontiers - in Macedonia, the Eastern Serbia, North Dobrudzha and Banat. The Department of Ethnomuseology studies the problems of contemporary museology and ethnology.

Scientific Information and Documentation
The Department includes a specialized ethnographic archive, a library and a group for source searching and publishing. The archive contains the oldest and richest funds of specific ethnographic sources. It is divided into several funds - written sources, photos, audio-records, old photos and portraits. Field work and the search for new sources enrich continuously the sources base. The publication of sources and the digitalization are combined with theoretical developments on ethnographic sources and methodological principles at their publication. The library fund contains over 25 000 volumes of books, periodicals and specialized reference books.

National Centre for Intangible Cultural Heritage
Structure of the center: Archive and Librarian Bibliographic center.

The Archive holds collections and documents which present the entire folk tradition and heritage and their dynamics in the following sections: Video-Archive, Audio-Archive, Photo-Archive, Paper Based-Archive. The archive items represent the universal spheres of folklore and cultural traditions: verbal, ritual and festive (calendar, family, work and other); musical (vocal and instrumental); dancing; folk arts and visual artefacts. The Library fund contains 6 206 volumes. Special priority of the Centre is the modernization of the scientific information complex and the digitalization of archive items to ensure the preservation of endangered unique cultural artefacts.

In 1892 the National Museum of Sofia was founded, with an Ethnographic Department. In 1906 the Department became the Bulgarian Ethnographic Museum and in 1949 - the Ethnographic Institute with Museum at BAS. The Institute of Folklore Studies was established in 1973. In 2010 the two institutes were merged into the Institute of Ethnology and Folklore Studies with Ethnographic Museum.

Institute for Historical Studies (IHistS)

1113Sofia, 52, Shipchenski prohod Btvd, Bl. 17;
Tel. (+359 2) 870 85 13, Fax: (+359 2) 870 21 91
E-mail: ihistory@ihist.bas.bg
URL: htpp://**www.ihist.bas.bg**

The Institute for Historical Studies is a scientific center for investigation of problems of the Bulgarian and general history. Focused are theoretical and specialized problems of national history - political, socio-economical, diplomatic, religious and cultural, from the time of the formation of the Bulgarian state until present days. Main fields of scientific research are: the comparative historical studies on the role and significance of Bulgaria in the general historical process, the contribution of the Bulgarian nation in the cultural treasury of mankind, the „Bulgarian national question", the Bulgarians outside the borders of the Bulgarian state, the effect of historical development on the contemporary situation of the Bulgarians and their national identity. Scientists from the Institute take part as experts in projects within various state and municipal organs, government and non-government institutions.

DEPARTMENTS

Middle Ages Bulgarian History
The Middle Ages Bulgarian history, prosopography and historical geography. Publication of sources of Middle Ages history - Greek, Latin and the „Byzantinobulgarica" series.

History of the Bulgarian People in 15th-19th Century
History of the Bulgarians under Ottoman rule; the formation of the Bulgarian nation; the struggle for national liberation; church movement, the development of the Bulgarian education and the establishment of the new Bulgarian culture at the time of the National Revival. Discovery and publication of sources of the Bulgarian history.

Modern Bulgarian History
Development of the Bulgarian society from the Bulgarian Liberation in 1878 to World War II, and the establishment and consolidation of the modern Bulgarian State

Bulgarian History since World War II
The Bulgarian history after World War II, the transition from democracy to totalitarian society and its social,-political, economic and cultural dimensions.

History of the Bulgarian National Question
Development of the Bulgarian nation after the Liberation, role of the Great powers for the national status quo; the fate of the Bulgarians outside the boundaries of the Bulgarian state.

History of the World and International Relations in Recent and Most Recent Times
Historical development of Europe and the world; the policy of the Great powers, the international relations and the place of Bulgaria in the contemporary dynamic world.

Auxiliary Historical Sciences and Informatics
Specialized historical fields - source studies, paleography, diplomacy, genealogy, metrology, historical bibliography, etc. Publication of a Bulletin of Bibliography.

Scientific Archive
The Scientific Archive contains unique documents and their copies dating back from the 15th century to the present, collected from scientific archives and manuscript collections from all over the world. The „National Revival" Archive (2600 inventory items), the „Memories" collection (500 inventory items), the „Portraits" collection (2200 inventory items), the „Foreign Documents for the Bulgarian History" collection (19 collections with more than 1 million frames and 2 300 microfilms).

Library
Contains 60 000 volumes of specialized literature.

The Institute for Historical Studies was founded in 1947.

Institute of Art Studies (IAS)

1504 Sofia, 21 Krakra St.;
Tel. (+359 2) 944 24 14, (+359 2) 489 00 95,(+359 2) 489 00 94, (+359 2) 489 03 57, (+359 2) 489 03 58,
Fax: (+359 2) 943 30 92
E-mail: office@artstudies.bg URL: http://**www.artstudies.bg**

The Institute of Art Studies carries out fundamental and applied research in the following major research fields: fine arts, music, theater, screen arts, and architecture. Its mission is to study the processes in the sphere of art and culture; to investigate the cultural heritage in the context of Europe and the world from the point of view of cultural identity; to maintain and enlarge the academic archives and library funds, to compile and maintain databases; to disseminate scholarly results; to perform expert activities. The research topics cover the ancient, mediaeval and modern culture. Along with activities that deal with searching, documenting, describing and classification of scientific resources, monuments, manuscripts, printed editions, audio and video recording of artifacts and phenomena of different profile, another priority in the academic work is related to the cultural-historical analysis of the Bulgarian culture and its particular place in the context of the Balkans, Europe and the world. Of great importance are also activities concerning the modernization of the access and the use of the institute's archives.

DEPARTMENTS

Fine Arts
Ancient, mediaeval, National Revival and modern art in Bulgaria.

Music
Bulgarian issues in the fields of mediaeval music, church music, modern music, musical theater, ethnomusicology, and popular music.

Theater
History and theory of the Bulgarian theater from the 19th and 20th centuries, as well as problems related to the world theater.

Screen Arts
History and theory of cinema, issues of film studies, media studies, audiovisual arts and related technologies, as well as the documentation and informational funds concerning screen arts in Bulgaria.

Architecture
History of architecture and design culture in Bulgaria from antiquity to the present times.
National Centre for Preservation of Cultural Heritage

Centre for Information, Publication and Project Activity

Information Technologies Group

IAS was founded in 2010 by merging of the Institute of Art Studies (founded in 1947 on the basis of the Institute of Fine Arts and the Institute of Music) and the Centre for Architectural Studies (founded in 1949 as the Institute of Urban Development and Architecture).

National Archaeological Institute with Museum (NAIM)

1000 Sofia, 2, Saborna St.;
Tel. (+359 2) 988 24 06,
Fax: (+359 2) 988 24 05
E-mail: naim@naim.bg
URL; http://**www.naim.bg**

The National Archaeological Institute with Museum is engaged in a comprehensive study of the material and spiritual culture of the tribes and nations that inhabited the present Bulgarian territories from the ancient time till the AD 18th century. In the field of the Prehistoric research, the Karanovo chronological system was worked out in 1950s. Recently it became a standard in the studies of the Neolithic and Copper Age cultures in Central and South Eastern Europe. The results of the investigation of the tells in the villages of Ezero, Yunatsite, Nova Zagora, Dyadovo, Galabovo, etc. made possible to establish the chronological system of the Bronze Age in South Eastern Europe and to relate it to the systems in the Aegean-Anatolian and Central European regions. The significant contribution of the Thracians to the formation of the antique civilization is established. Thracian tombs have been revealed in the Valley of the Thracian Kings in the region of Kazanlak. The Thracian religious center near Sboryanovo village, Razgrad region, the antique and medieval center of Perperikon, Karanovo tell in Nova Zagora region, and other, are in a process of thorough research. The Museum houses the unique treasure of Valchitran, the artifacts from Duvanli, Plovdiv region, etc.
The studies include also the provincial Roman culture on the territory of present Bulgaria, the numerous coin hoards, epigraphic pieces from the antique period; the culture and history of the Bulgarian people from the 7th till the 17th century, connected with the formation of the Bulgarian state and nationality and with the struggles of the Bulgarians for independence and cultural and historical identity and legitimacy, with a special focus on the Old Bulgarian Capital cities of Pliska, Preslav and Veliko Tarnovo.
The National Museum of Archaeology is the oldest museum in Bulgaria. With its depot of 55 000 inventory numbers and about 300 000 coins, ateliers for conservation and restoration of paintings, ceramics, metal and stone, it is the major one in the country and one of the largest in Europe. The Museum organizes exhibitions in Bulgaria and abroad to popularize the culture in the Bulgarian territories among the general Bulgarian and world public.
NAIM is the center and coordinator of all field archaeological investigations in Bulgaria and also exercises scholarly and methodological control. Its academic staff takes part in various commissions for protection of the monuments of culture of worldwide, European and national importance, for working out the Bulgarian legislation relating to these problems and for its harmonization with the world standards.

DEPARTMENTS

Prehistory
Problems of living standards, culture and art in the Prehistoric Age; Cultural development and Paleo-ecological changes on the Balkans during the Late Pleistocene and Early Holocene; Material and spiritual culture of the Neolithic in the Bulgarian territories on the Balkan Peninsula; Material and spiritual culture of the Copper Age in the Bulgarian territories, Central and Southeastern Europe.

Thracian Archaeology
Ethno-genesis, cultural development and cultural interrelations of the Thracians; Studies of the Thracian culture in the Bulgarian territories during the Bronze and the Iron Age; Ethno-cultural characteristics of the Ancient Thrace 3rt - 1st millennia BC.

Classic Archaeology
Material culture and art in the Bulgarian territories during the Classic and Early Byzantine Ages; Antique culture along the Bulgarian Black Sea coast 6th c. BC - AD 6th c.; Material culture and art in the Bulgarian territories during the Late Antiquity; Roman provincial culture AD 1st - 3rd c.

Medieval Archaeology
Material and spiritual culture in the Bulgarian territories during the Middle Ages; Medieval Bulgarian town and village; The Old Bulgarian Capital towns of Pliska, Preslav and Veliko Tarnovo; Slavs and Proto-Bulgars; Culture in the Bulgarian territories from the early Ottoman Age till the Revival.

Numismatics and Epigraphy
Numismatic and epigraphic data on the history of the Bulgarian territories during the Antiquity and the Middle Ages; Bulgarian Cyrillic epigraphy; Antique epigraphy; Conveying information by means of sign-systems; Coinage and coin circulation in today's Bulgarian territories 4th C. BC - AD 7th C.

Unit for Interdisciplinary Studies in the Bulgarian Archaeology

Museum of Archaeology

BRANCHES
Shumen

Veliko Tarnovo
Medieval Bulgarian town and village; the Old Bulgarian Capital towns of Pliska, Preslav and Veliko Tarnovo; Slavs and Proto-Bulgars; Culture of the Bulgarian territories from the early Ottoman Age till the Revival

NIAM is a successor of the activities of the National Museum founded in 1893. The Institute of Archaeology was founded in 1920 after an edict of Tsar Boris III and a resolution of the National Assembly. In 1948 the Museum and the Institute were incorporated in BAS structure as the Archaeological Institute with Museum.

Cyrillo-Methodian Research Centre (CMRC)

1000 Sofia, 13, Moskovska St., P.O.B 432;
Tel. (+359 2) 987 02 61,
Fax: (+359 2) 986 69 62
E-mail: kmnc@bas.bg
URL: http:// **kmnc.bas.bg/**

The Cyrillo-Methodian Research Centre is oriented to the comprehensive study of the life and the work of the first Slav teachers Sts Cyril and Methodius, their disciples and followers, the links of the Cyrillo-Methodian work with Byzantine and West European mediaeval culture, the Old Bulgarian written monuments of the 9th—11 1h century, the further development of their texts, and the Cyrillo-Methodian traditions in Europe. The creation of the Bulgarian and Slavonic script by Sts Cyril and Methodius was of enormous importance for Bulgarias's historical development, and for the preservation of the national identity of the Bulgarian people in all the vicissitudes of its history. The Cyrilo-Methodian work and activity were also the greatest contribution of the Bulgarians to the European and world culture. The scientific research of the Centre is focused on the discovery, publications and study of materials concerned with the life and work of the Slav apostles in the Slavonic, Byzantine and Latin written heritage; the study of the Old Bulgarian translation of the Old Testament made by Methodius and edited at the Preslav literary center; the study of the original hymnographic works of the disciples of Sts Cyril and Methodius - Constantine of Preslav and Clement of Ohrid. The Bulgarian mediaeval translations of the stories of Paterikon are studied and the artistic features of the Old Bulgarian mediaeval works and their cultural-historical value are elucidated. The essential characteristics of the first Bulgarian graphic system, the Glagolithic alphabet, the formation and development of the literary Old Bulgarian language are revealed. Original Bulgarian works in Slavonic mediaeval MSS kept in foreign repositories are found and described. A significant part of the activities of the CMRC is the organizing of exhibitions, participation in print and electronic media, writing of popular science materials, dedicated to the activity of Sts Cyril and Methodius and its traditions. The Centre has an impressive collection of microfilms and photocopies of medieval manuscripts and a complete card-index of Cyrillo-Methodian bibliography; the manuscript collection and the card-index are digitalized.

EQUIPMENT

Specialized computer software for word processing, including several complete sets of Old Bulgarian fonts and specific tools for Old Bulgarian Studies and their sources.

DEPARTMENTS

Cyrillo-Methodian Sources and Traditions
Tracing, study and scientific publication of the Slavonic, Greek and Latin sources of the Cyrillo-Methodian life and work; the collection and publication of the complete Cyrillo-Methodian bibliography after 1940. Comprehensive study of the Cyrillo-Methodian traditions in the Middle Ages, the National Revival and in modern Bulgaria and in other countries.

Cyrillo-Methodian Texts
Study of the original and translated works of the first Slav teachers, their disciples and followers in the 9th-10th century; an exhaustive study of the Old Bulgarian written monuments and their later Bulgarian, Russian, Serbian and Moldovian copies.

CMRC was founded in 1980.

MAN AND SOCIETY

Institute for Economic Studies (IES)

1000 Sofia, 3, Aksakov St.;
Tel. (+359 2) 810 40 10;
Fax: (+359 2) 988 21 08
E-mail: ineco@iki.bas.bg, director@iki.bas.bg
URL: **www.iki.bas.bg**

The Institute of for Economic Studies carries out theoretical and applied research in different fields of economics. The main thematic areas of the work are based on the necessity to help the public in solving economic problems and the need to develop the scientific potential.
Priorities:
Strategy for economic development of Bulgaria.
Competitiveness of the Bulgarian economy in the common European market.
Restructuring of the enterprises and improvement of their management.
Social policy and employment.
Adaptation of the Bulgarian agriculture to the mechanisms of the common agricultural policy of the European Union.
Regional policy and protection of the environment.
Development of the integration processes in the EU.

MODELS, CONCEPTS, METHODS AND PROGNOSES

Concepts for macroeconomic policy Econometric macroeconomic models
Short-term and mid-term forecasts for the development of the Bulgarian economy
Conceptual models of the institutional structures and the economic instruments for the management of the state participation Concept for the reform in the system for social insurance Concept for the regional policy in Bulgaria Methodology for measuring and analysis of the social processes
Adaptation and harmonization of the standards and norms of the international competitiveness of the national production

DEPARTMENTS

Economics of the Firm
Microeconomics, industrial organization and business administration; entrepreneurship and development of small and medium-sized business; corporate management; industrial policy; competitiveness of the business organizations; organization, management, financial and market restructuring of the firms.
Regional and Sector Economics
Theoretical and applied research of the economic sectors, regional and cross-border regions, ecology and protection of the environment; regional integration and regional policy; adaptation of the agriculture, agricultural and consumer policy to the Common Agricultural Policy of the European Union.

Macroeconomics
Global parameters of the economy and the economic development; macro- economic structures; factors for economic growth, strategic and analytic prognostic studies; social support and insurance; risk groups, inequality and poverty; labour market and unemployment; economic aspects of the science and education; macroeconomic measurements, scale and infrastructural analysis.

International Economics
World economy, global and regional problems of the economic development and the economic interrelation between countries and regions; international economic organizations - structure, principles of functioning and their role in the world economy; international situation, prices, goods and stock exchanges; national economy and international economic aspects of development at a macro-economic, branch and firm level, financial markets.

IES was founded in 1949.

Institute for the State and Law (ISL)

1000 Sofia, 4, Serdika St.;
Tel. (+359 2) 987 49 02,
Fax: (+359 2) 989 25 97
E-mail: ipn_ban@bas.bg
URL: http://**ipn.bas.bg**

The Institute for the State and Law carries out fundamental, applied and interdisciplinary research in the main areas of law with the aim to strengthen the rule of law and improve the citizens' legal culture. The priorities of the Institute activities are:
Providing support for the legislative branch of government, as well as for the administrative and judicial bodies.
Research on different aspects of the harmonization of Bulgarian legislation with the European Union law.
Studying the legal mechanisms for human rights protection.
Scientific projects, which develop the legal studies and help implement these studies into practice; expert and consulting activities for the benefit of different state bodies of all branches of government.
Training of high-qualification specialists, running courses for specialization and qualification of practicing lawyers.

DEPARTMENTS

Public Law
Theoretical and applied research in the field of constitutional law, administrative law, financial law and law sociology.

Civil Law
Studies in the field of civil law - general part, contracts, property rights, intellectual property rights, commercial law, family law, civil procedure, etc.

International Law
Research in the field of international public and private law, rule of law and human rights in the international law, harmonization of Bulgarian legislation with the European Union law.

Criminal Law
Research on the state criminal policy, the reform of criminal law and procedure in Bulgaria, the police and judicial cooperation in criminal matters in EU.

ISL was founded in 1947.

Institute for Population and Human Studies (IPHS)

1113Sofia, Acad. G. Bonchev St., Bl. 5, 6;
Tel/Fax: (+359 2) 870 32 17; (+359 2) 870 53 03
E-mail: office @iphs.eu
URL: http://**www.iphs.eu**

The Institute for Population and Human Studies is a center for theoretical and applied research and training of qualified specialists in different fields of demography and psychology. The mission of the Institute is: demographic and psychological studies of the Bulgarian population, revealing its development trends and factors, analysis of reproductive and mental processes in order to assist institutions in implementing the strategy and policies on demographic and personal development in terms of European integration and global trends.
Research priorities are:
Structural changes in population due to falling birth rates, ageing, internal and external migration, decreasing role of the family institution, health and other demographic challenges.
Changes in the demographic behaviour of the population in Bulgaria: theory, methodology and empirical analysis in a period of economic and demographic crisis.
Integration processes and national identity, taking into account the globalisation, ethnic and religious diversity and increased population mobility.
Changes in the personal potential for development and lifelong learning and creating practical approaches for improving the quality of life.

DEPARTMENT
Demography

Reproductive Processes and Population Structure
Fertility, reproductive behaviour and reproductive health, family and marital dynamics, and sexual culture; gender interrelations, family planning and family policy; population structures and population ageing, mortality and causes of death, life expectancy and population life potential, population modelling and prognoses, health-oriented behaviour, socio-economic and demographic consequences of population ageing.

Economic and Historical Demography
Impact of the rapidly changing economic factors in the contemporary situation, such as labour market, working conditions, unemployment, standard of living, quality of life, etc., on the demographic processes and structures, demographic attitudes and demographic behaviour of the population; Analysis of the reproductive attitudes, nuptiality and divorces, new forms of family life, internal and external migration and their conditioning by economic activity, field of work and working conditions, education, age, etc.; Investigation of the retrospective dynamics of the historical population development of the Bulgarian territories.

DEPARTMENT
Psychology

Psychology of Personality and Psychometric Methodology
Levels and mechanisms of regulation of human behaviour and design of measurement methods. Value system of the Bulgarians today; psychosocial identity (national, European, virtual); mental health and well-being; cross- cultural comparisons; basic personality dimensions and assessment instruments.

Social, Work and Organizational Psychology
Problems of societal development. Review of social processes, interethnic attitudes, citizen involvement in the European integration processes, political values, aggressive behaviour analysis, issues of work efficiency in various organizational settings, leadership practices, group relations, psychic well-being and satisfaction.

Developmental and Health Psychology
Attention, perception, memory and concept development in childhood, and learning disabilities, are investigated using neuropsychological and psychophysiological methods. Brain and behaviour relationship in children with attention disorder with/or without hyperactivity and in adults with sleep disturbances. Lateralization of cerebral functions in pathology and normal development. Psychological underpins needed for pursuing lifelong learning.

IPHS was founded in 2010 by merging of the Centre for Population Studies (founded in 1990 as the Institute of Demography) and the Institute of Psychology (founded 1973).

Institute for the Study of Societies and Knowledge (ISSK)

1000 Sofia, 13-A, Moskovska St.;
Tel. (+359 2) 980 90 86, 980 94 89,
Fax: (+359 2) 980 58 95
URL: http://**sociology-bg.org**

The Institute for the Study of Societies and Knowledge conducts complex philosophical, sociological, and science-studies-related research on knowledge, values, Man and society, in accordance with the European criteria and the world trends in science. The Institute trains highly qualified specialists in philosophy, sociology, and science studies, carries out expert and consultancy activities for the needs of governance and organization in all spheres of social practice related to the social-economic, cultural, and political development of Bulgaria. Scientists from the Institute participate in the elaboration of national strategies and policies, prognoses, and assessments of social processes and problems. The main priority of the Institute activity is the study of societal changes, social innovations and knowledge.

The main areas of research are:

Ontological and logical models; epistemological principles and approaches to their study.

Interaction between the Bulgarian and European philosophical cultures.

Dynamics of ethical and aesthetic values.

Universal essence of religion as a basis for interfaith dialogue. Structure and dynamics of scientific knowledge and the network of social factors of the development of science and innovation; modern forms of education.

Social stratification and inequalities, poverty and exclusion, forms of social integration and solidarity.

Ethnic and socio-cultural composition of Bulgarian society, gender, disability and equal access.

European integration and globalization.

Processes in post-industrial and globalized knowledge-based societies. Models and policies for successful development.

Regional and local development, environmental practices and new social risks.

Development of civil society - social activity, social capital and credit. Socio-cultural conditions for crime and corruption.

DEPARTMENTS

Ontological and Epistemological Studies

Theoretical analysis of the deontic preconditions related to the origin, structure, and dynamics of knowledge in the context of the European fundamental and applied philosophical tradition. Re-estimation of the fundamental philosophical determinants of human creative activity as presented in the classical and non-classical philosophic discourses; the study of epistemic and socio-cultural determinants of scientific knowledge. Process ontology, ontological and epistemological foundations of artificial intelligence, modal ontology, dynamic ontology, ontology of conflict and risk situations, intelligence and complexity, structural stability, order and control in the dynamics of complex hierarchical systems.

Logical Systems and Patterns
Relevance logic, semantics of possible and impossible worlds, holistic semantic approach to the theory of categories based on propositional logic, demonstration of the insolubility of Gudel's First Theorem, philosophical logic and the prerequisites for the development of modern logic in our country, context as a logico-philosophical category, the connection between logic and social critical ontologies, search for effective mechanisms of application of non-classical logical systems and models.

History of Philosophical and Scientific Ideas
National philosophical thought, connections between the national and the universal in the field of philosophy and philosophical culture, influences and receptions of European and world philosophy and specificity of the Bulgarian philosophical thought in the context of our national cultural identity. Contemporary philosophy. History of science, meta-cognition of the historical development of science, of science policies, and the evolution of scientific methods and categories, historical-scientific periodization, science-studies and bibliometric interpretation of the scientific achievements, the importance of the social history of science and of scientific potential, the role of scientists in the processes of scientific-technological progress.

Social Theories, Strategies and Prognoses
Motive forces and relations between the different types of factors in social development during the 21st century. The processes of globalization and their impact on the national states and regional processes. Local projections and perspectives of global and European prognoses for the development of the Bulgarian society in the context of the EU programme Europe 2020. The role of Man in the functioning of various types of society. Security and risk, secularization and desecularization, and different factors for their manifestation and management. Functioning of various types of worldviews and ideologies in politics, law, and economy.

Public Policies and Social Changes
The development of the economy and society of Bulgaria, social-economic impacts of the EU enlargement and of the social changes connected with the dynamics and structure of the labour market. Poverty; work, employment and unemployment; social exclusion, inequalities, social risk; chronic illness trends, invalidity, healthcare, social integration and inclusion of risk groups, etc. Development of human resources and their realization in market economy conditions. Strategies and policies for local development, increasing of employment, and social inclusion. Study and assessment of social and economic policies aimed at regulation and development of phenomena and processes in the social and economic spheres.

Social Control, Deviation, and Conflicts
Social norms, deviations, and control, deviant motivation and behaviour, anomie processes in society and marginalization of large social groups. Risks, adaptation, and the cost of social transformation in conditions of globalization, with an emphasis on vulnerable social groups. Social inequalities and conflicts in conditions of change. Theory, methodology, and methods of sociology of deviant behaviour. Analysis of the types of deviant behaviour according to its forms and from the perspective of the subjects of deviance, with a view to prevention and resocialization.

Knowledge-Based Society: Science, Education, and Innovations
Meaning and status in the value system of the knowledge-based society and of scientific and technological activities, of creative activity in the field of science, education, and innovation. Correlation between power, truth, beauty, ethics, and efficiency in the process of scientific creativity. Processes of production, distribution, and use (transfer) of scientific and technological results in the knowledge-based society. Public understanding and trust in science

and technology, and the social responsibility of science and education. Impact on research, education systems, and innovative processes of contemporary socio-economic trends towards internationalization and globalization. Human, material, and informational resources of science, education, and innovation. Organization and management of science and education, assessment of their effectiveness, including scientometric methods.

Religion, Beliefs, and Everyday Life
Religion in contemporary society, new religious movements. Religious consciousness, functions of religion as a socially consolidating, psychologically integrating, and state shaping force. World religions. Mutual understanding between different cultures and faiths, the search for universal values, intercultural dialogue, psychological and social integration of individuals and society, answers to ideological and existentially significant issues.

Culture, Values, and Morality
Dynamics of ethical and aesthetic values in contemporary social life. Morality in the Bulgarian society in conditions of social and biotechnological risk. Protection and transformation of the Bulgarian national moral and aesthetic values in conditions of European integration and globalization. Parameters of the common cultural environment. Ethical and aesthetic value levers acting on the national identity.

Anthropological Studies
Problems facing the human existence in its constantly changing diversity - from bodily transformations to changes affecting the identity of entire societies and nations, as a result of the globalization processes. Sociocultural conditions of human existence. Defining of borderline problems of meaning, which are unattainable through mono-disciplinary analyses and interpretations.

Communities and Identities
Social stratification, inequalities, social mobility. Quality of life, lifestyle and consumption patterns. Gender and women's studies. Sociology of village and rural areas. Middle class, small and medium businesses. European policy, social policy, and labor market. Changing identities and nation-state in the process of globalization and European integration. Social time and life-worlds. Civil society and new ethnic communities. Ethnic tensions, ethnic coherence, ethnic exclusion. Social distances, We-They-images, prejudices and stereotypes in late modernity.

Centre for Empirical Social Studies
Cognitive capacities of the existing approaches, methods and tools for analysis of social phenomena and processes, and their adaptation to the needs of scientific research. Empirical research for the needs of BAS institutes, of the social management, the business, etc. Monitoring the implementation of key strategies and social policies in main sectors and social systems. Methodological studies, assessments, and generalizatons concerning the empirical studies of the social dynamics.

ISSC was founded in 2010 through merging the Institute of Sociology (founded 1968), the Institute of Phylosophical Research (founded 1945) and the Centre for Science Studies and History of Science (founded 1995).

RESEARCH UNITS AND BRANCHES

Institute of Oceanology (10) - **Varna**
Centre for Hydro- and Aerodynamics (Institute of Metal Science, Equipment and Technologies with Centre for Hydro- and Aerodynamics, IMSET-CHA) - **Varna**
Division „Observatory" and „Cosmos" Ltd (Institute of Space and Solar-Terrestrial Research, SSTRI) - **Stara Zagora**

Paleontological branch of the National Museum of Natural History (NMNH) - Asenovgrad Branch of the National Institute of Archaeology and Museum (NIAM) - Veliko Tarnovo Branch of the National Institute of Archaeology and Museum (NIAM) - Shumen Central Laboratory of Applied Physics (CLAP) - **Plovdiv**
Laboratory „Optical Systems" (Institute of Space and Solar-Terrestrial Research, SSTRI) - **Shumen**
Geotechnical Research Station (Geological Institute, GI) - **Ruse**
National Astronomical Observatory (Institute of Astronomy with National Astronomical Observatory, IANAO) - Rozhen, the Rodopi Mountain
Astronomical Observatory (Institute of Astronomy with National Astronomical Observatory, IANAO) - **Belogradchik**
Basic Environmental Observatory „MUSSALA" (Institute of Nuclear Research and Nuclear Energy, INRNE) - Mussala, the Rila Mountain

FIELD STATIONS

of the Institute of Biodiversity and Ecosystem Research
„Kalimok" Biological Experimental Station with Centre for Breeding and Reintroduction of
Rare Bird Species - **Tutrakan**
Laboratory of Marine Ecology - **Sozopol**
„Srebarna" Lake Ecological Station - **Silistra**
„Plana" Ecological Station - the Plana Mountain
„Beglika" Mountain Experimental Station - the Western Rodopi Mountain • „Atanassovsko lake" - Burgas „Parangalitsa" - the Rila Mountain

FIELD STATIONS

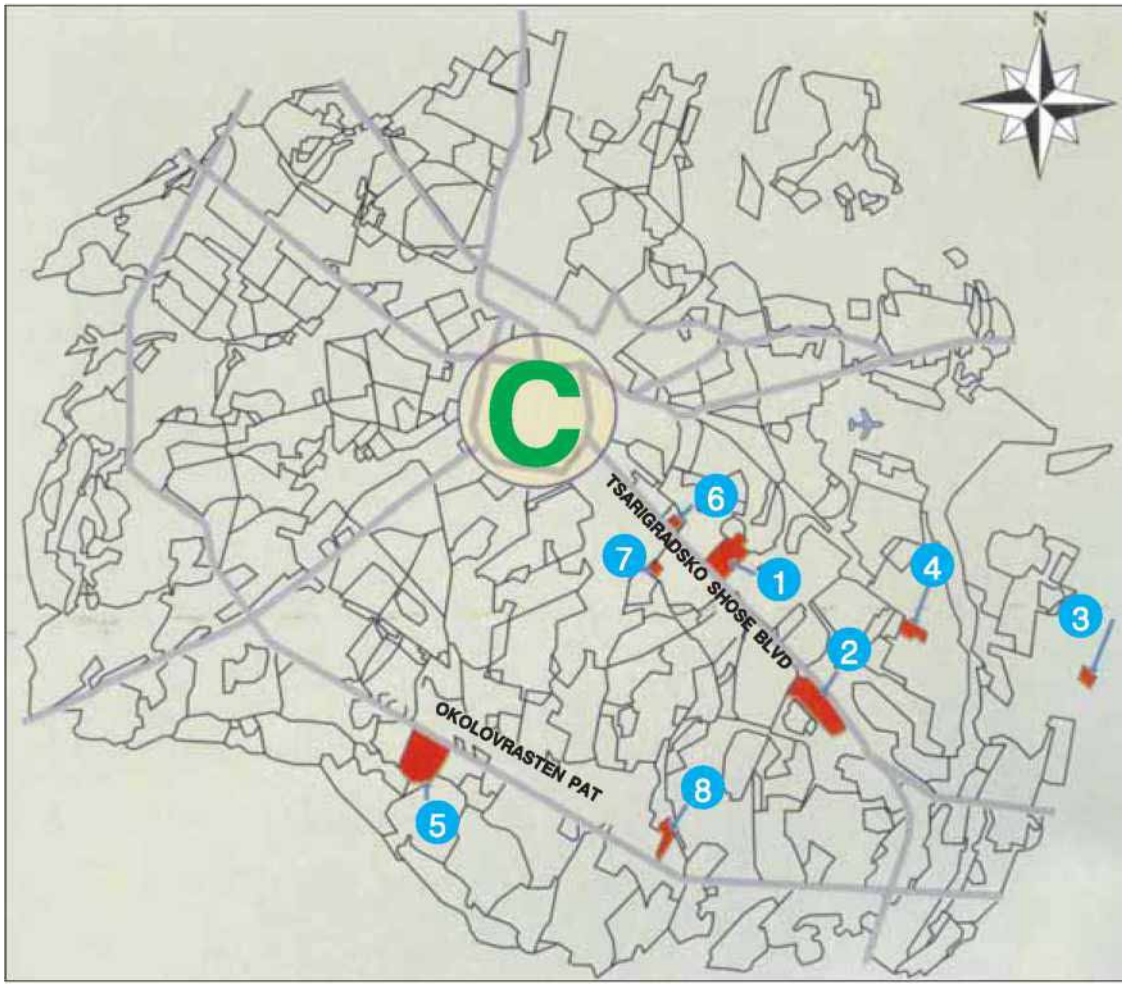
of the National Institute of Archaeology and Museum
Field Station - **Pliska**
Field Station - **Preslav**
Field Station - **Nove, Svishtov**

OTHERS FIELD STATIONS

Laboratory „Salt Systems and Natural Resources" (Institute of General and Inorganic Chemistry) - **Burgas**
Experimental Field Base of the Institute of Plant Physiology and Genetics - **Stamboliyski**
Laboratory of Applied Biotechnology (Institute of Microbiology, IMicB) - Plovdiv Laboratory of Bioactive Carbohydrates (Institute of Organic Chemistry with Centre of Phytochemistry, IOCCP) - **Plovdiv**
Research Base of the Institute of Oceanology, IO - village Shkorpilovtsi, **Varna**

Part III

CAMPUSES AND UNITS OF BAS



UNITS OF BAS IN CITY CENTRE
Academy Administration, Central Library, Scientific Archives and Centre for Education Cyrillo-Methodian Research Centre Institute of Ethnology and Folklore Studies with Ethnographic Museum
National Institute of Archaeology and Museum
Institute of Art Studies
Institute for Balkan Studies with Centre of Thracology
Institute for Economic Studies Institute for the State and Law Institute for Population and Human Studies
National Museum of Natural History

① Campus - 1

② Campus - 2

③ Institute of Plant Physiology and Genetics

④ Science and Technological Park

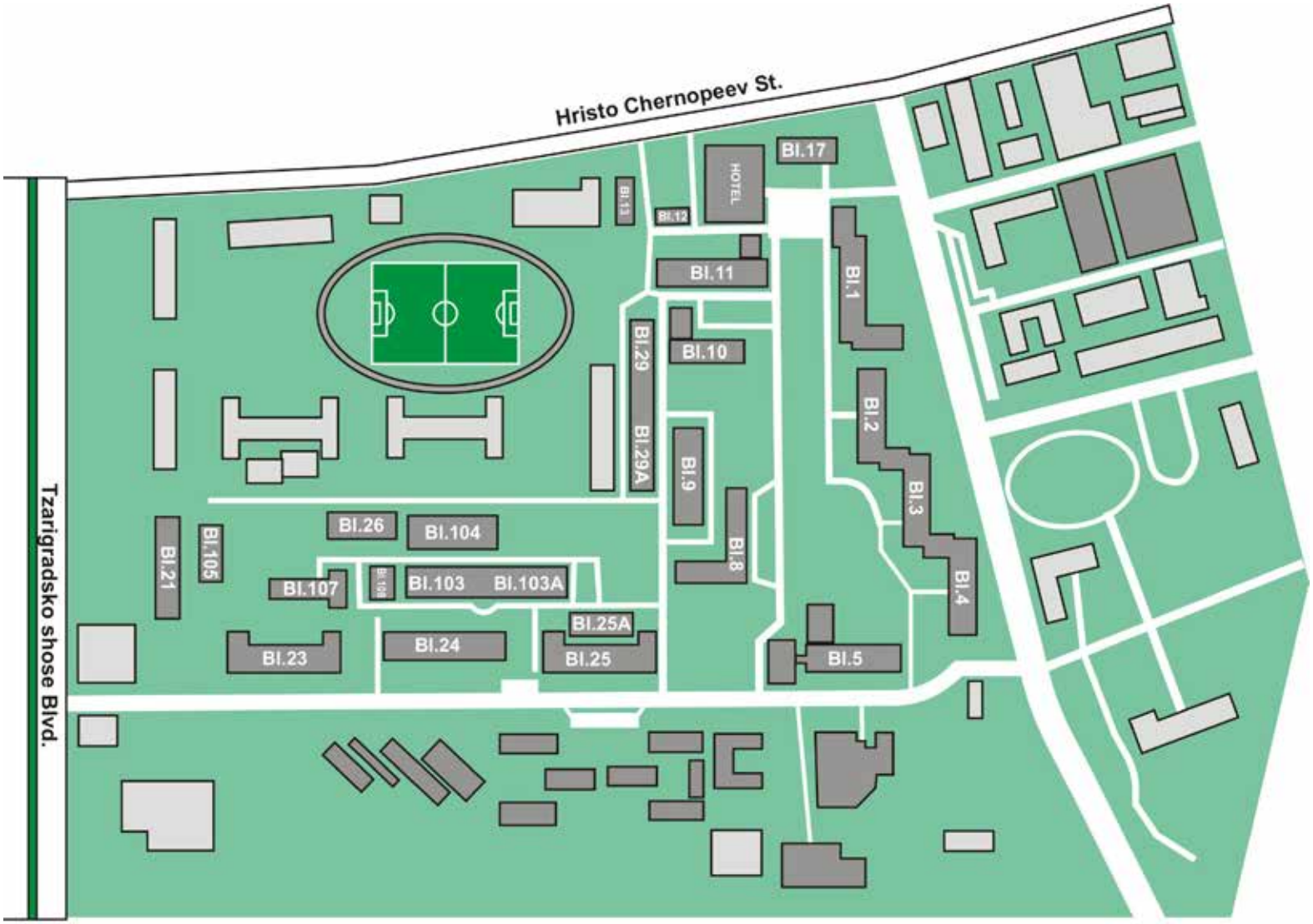
⑤ Botanical Garden

⑥ Institute of Biology and Immunology of Reproduction

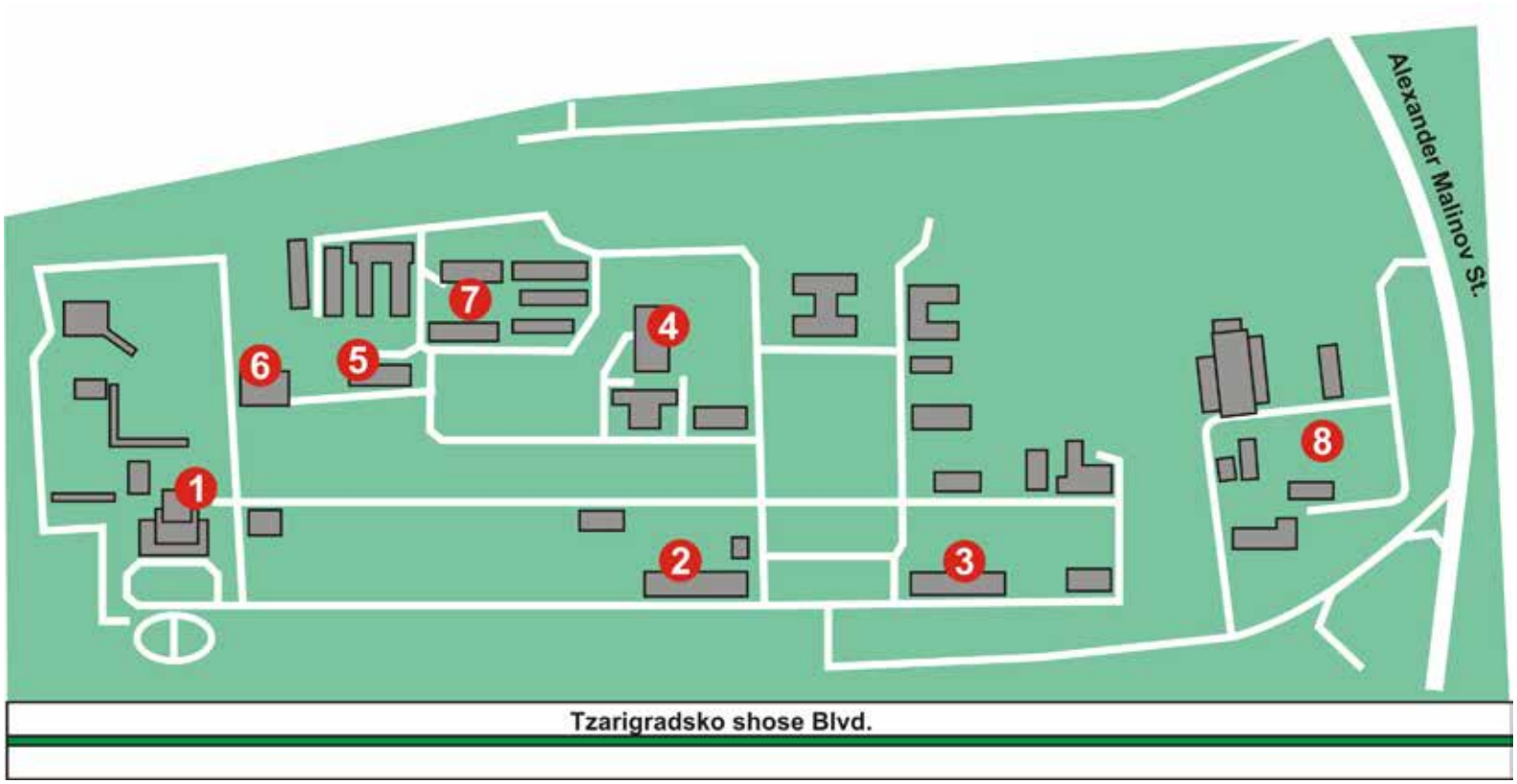
⑦ Institute of Biodiversity and Ecosystem Research

⑧ Institute of Forest

CAMPUS - 4th km



CAMPUS - 8th km



① Experimental Nuclear Reactor

② Institute for Nuclear Research and Nuclear Energy and Institute of Solid State Physics

③ Institute of Electronics

④ Central Laboratory of Solar Energy and New Energy Sources

⑤ Space and Solar-Terrestrial Research Institute

⑥ Institute of Mineralogy and Crystallography

⑦ Institute of Metal Science, Equipment, and Technologies

⑧ National Institute of Meteorology and Hydrology

Sources and citations (among others):

www.all4sofia.com/
www.bulgariatravel.org
http://www.en.nhif.bg/web/guest/home
http://www.sofia-airport.bg/en/passengers
https://www.sofiatraffic.bg/en/
https://www.bas.bg/images/files

Compiled by: Tomina Galibova