Curriculum of BioN:

Postgraduate Training Network in Biotechnology of Neurosciences

Guidelines for Partners Institutions

December 2012

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BioN Curriculum

BioN curriculum consists of 5 major parts:

1. **Lectures and Seminars**
2. **BioN Schools**
3. **Courses in Russian partner universities (modular and standard)**
4. **Practical Placements in the EU universities**
5. **Methodological trainings**

Each university gets BioN´s guidelines regarding each type of activities regarding the BioN scientific priorities[1].

BioN postgraduate gets a certificate after passing through each activity of BioN. Our postgraduate has the opportunity to obtain the BioN certificate if a set of 15 ECTS will be provided in the following activities:

- Lectures and Seminars of BioN (6 ECTS)
- International Schools and Trainings in neurobiology, such as BioN schools (3 ECTS)
- Getting a positive review of Ph.D. thesis from the BioN expert (6 ECTS). The expert will be appointed by BioN coordinator in Russia

[1] See scientific priorities in the **Annex I**

I. Seminar series on Neurotechnology

Regular seminar series is given by leading scientists representing broad spectrum of neuroscience research, from cognitive and behavioural to molecular neuroscience. Seminars will provide the audience with a wide overview how new methodological approaches are being used in various fields of neuroscience. A particular emphasis will be made on what advantages a particular technology or method offers to the bench science, and what kind of new questions can arise and may be addressed using these applications.

Frequency: once/twice a month

Format: 45 min talk +15 min questions

Where: rotates between Lomonosov MSU, SPbSU, SFU, Lobachevsky NNSU, IHNA, AU, MSUPE and Ioffe PTI[2]

Speakers: invited from the Partner Institutions from EU or/and external experts

Primary audience: postgraduate students, senior scientists

Language: English/Russian

Schedule of seminar lectures:

Date	Title	Speaker	Host Institution
21.10.2010	Genetic models of dopamine dysfunction	Raul Gainetdinov (IIT)	Lomonosov Moscow State University
01.12.2010	Current achievements and problems in the study of the brain extracellular matrix	Alexander Dityatev (IIT)	Lobachevsky State University of Nizhny Novgorod
17.12.2010	Use of modern methods in analysing MEG and EEG data in cognitive neurobiological studies of language and speech	Yury Shtyrov (MRC-CBU)	Saint-Petersburg State University
29.12.2010	Neuromarketing: Pro & Contra	Vasily Klucharev (Erasmus Rotterdam University)	Saint-Petersburg State University

[2] See abbreviations of Institutions-Consortium members in the **Annex II**

17.03.2011	Career in Neuroscience	Yury Shtyrov, (MRC-CBU, Cambridge, UK) и Vasily Klucharev (Erasmus Rotterdam University).	Saint-Petersburg State University
16.05.2011	Non-linear dynamics of spike generation in neurons and its implications for neural activity	Boris Gutkin, Ecole Normale Superieure - Paris	Saint-Petersburg State University
19.05.2011	The brain on-line: reality and fantasy	Alexander Kaplan (MSU)	Lobachevsky State University of Nizhny Novgorod
24.05.2011	Cognitive space and brain rhythms	Georgy Ivanitsky (IHNA)	Saint-Petersburg State University
23.06.2011	Imaging surround modulation in human visual cortex	Simo Vanni (Aalto University)	Lomonosov Moscow State University
15.08.2011	ERP and eye-tracking studies of language, attention and social development in low and high-risk infants: Audiovisual speech processing in the first year of life	Elena Kushnerenko (ECL, UK)	Saint-Petersburg State University
05.09.2011	School "Neurobiology and new approaches to artificial intelligence and brain"	Evgeny Aydarkin	Southern Federal University
06.09.2011	Modern Teaching Methodology	Evgeny Aydarkin	Southern Federal University
07.09.2011	Neuroeconomics	A. Shestakova, V. Klucharev, O. Klepikov	Southern Federal University
06.10.2011	Origin of cortical slow waves	Igor Timofeev	Lomonosov Moscow State University
09.12.2011	Source space connectivity analysis based on MEG data	Matias Palva	Saint-Petersburg State University
20.12.2011	Mechanisms and therapies of neonatal and pediatric seizures	Kai Kaila (University of Helsinki)	Lomonosov Moscow State University
20.12.2011	Federal government requirements for the programs of post-graduate education	Mosicheva I.A., Karavaeva E.V.	Lomonosov Moscow State University
21.12.2011	"Mechanisms and therapies of neonatal and pediatric seizures" and "How does inhibition work in the brain?"	Kai Kaila (University of Helsinki)	Saint-Petersburg State University
12.01.2012	Evoked potential in response to speech stimuli as an indicator of predisposition to autism	Olga Sysoeva (IHNA)	Institute of Higher Nervous Activity RAS
07.02.2012	Astrocyte regulation of short-term synaptic plasticity	Maurizio De Pittà, School of Physics and Astronomy, Tel Aviv University.	Lobachevsky State University of Nizhny Novgorod
24.02.2012	Electrophysiological correlates of mental activity of man in the blind game of chess with the computer program. Wavelet analysis.	Suvorov N.B., Bojokin S.V.	Saint-Petersburg State University

19.03.2012	How to make a career in neuroscience (Russian and foreign experience)	Pavel Balaban, Yury Shtyrov	Lectrorium of Polytechnical Musem, Moscow
09.04.2012	In vivo microscopy applications	Leonard Khirug (University of Helsinki)	Saint-Petersburg State University
09.04.2012	EEG study of speech	Irina Simanova	Lomonosov Moscow State University
24.04.2012	1. How does the brain produce an inner world of experiences? 2. Imaging genetics of episodic memory	Lars Nyberg, Johan Eriksson (UmU)	Institute of Higher Nervous Activity RAS
22.05.2012	Psychophysiological mechanisms of decision-making at the task of visual search in human. Psychophysiology of reading	Latanov A.V. (Lomonosov MSU)	Southern Federal University
23.05.2012	Neurological signatures	V. Klucharev, A. Shestakova, S. Vanni	Moscow State University of Psychology and Education
24.05.2012	Studying language in and by the brain	Yury Shtyrov (MRC-CBU)	Moscow State University of Psychology and Education
19.06.2012	Computational Neuropsychopharmacology of Addiction	Boris Gutkin (ENS, Paris), Georgiy Bobashev (RTI, USA)	Saint-Petersburg State University
21.06.2012	Cognitive Decision Making and Neurointerfaces	Etienne Koechlin (ENS, Paris), Vadim Nikulin (Charite Berlin Medical School), Sergei Borisov (Gothe University, Frankfurt).	Saint-Petersburg State University
02.07.2012	Genetic models of human diseases in experimental neuropharmacology	Raul Gainetdinov (IIT)	Saint-Petersburg State University
04.09.2012	Loss of visceral pain following colorectal distension in an endothelin-3 deficient mouse model of Hirschsprung's disease	Nicholas John Spencer	Lomonosov Moscow State University
17.09.2012	Attention and human brain function	Kimmo Alho (FGSN)	Saint-Petersburg State University
24.09.2012	Mechanisms of Functional Interhemispheric Asymmetry	A. Kaplan, V. Fokin	SFU, Rostov-on-Don
06.11.2012	Functional selectivity of legands of G protein-coupled receptors (GPCRs)	Raul Gainetdinov (IIT)	Lomonosov Moscow State University
22.11.2012	Exploring the role of the glycine receptor in the interaction of neuronal and glial cells of the brain	Michael Druzin (UmU)	Lobachevsky State University of Nizhny Novgorod
04.12.2012	Functional selectivity of legands of G protein-coupled receptors (GPCRs)	Raul Gainetdinov (IIT)	Saint-Petersburg State University

II. Schools – intensive trainings in Neurotechnologies. Guidelines for Intensive Schools:

Duration: 5-7 days

Number of students: 20-40

Language: English

Faculty: Involvement of relevant lecturers from the consortium and EU partners is obligatory.

Structure:

1. Theoretical tutorials
2. Practical training
3. Science fair
4. Generic skills

Science fair

Each student admitted to the school is supposed to present a poster (strictly in English) or give an oral presentation of his recent research. Best poster/talk competition is exercised to stimulate student's activity. Round table at the end of science fair is set up to get student's feed-back on their PhD training.

Generic skills

Each school is expected to include 1-day of generic skills training with the idea to introduce students to people who are **not (not only)** directly involved in bench science but moved their careers to associated fields.
Some proposed topics (choose one for your school):

- Career in life sciences (speakers: people who set up their own biotech companies)
- Grant writing (speakers: executives and administrators of funding bodies)
- Presentation skills (speakers: scientific journalists, PR specialists)
- Paper writing (speakers: scientific journal editors)

List of schools organized by BioN:

School in Neurotechnologies 2010:"Bioeconomics based on knowledge: policy of innovative development of biotechnology" September, 24-29, 2010 school.neurobiotech.ru

Place & organizers: Bekasovo, *Anna Shestakova, Alexey Ossadchy,* Saint-Petersburg State University; *Victoria Moiseeva,* Lomonosov Moscow State University, *Evgeny Blagoveshinky,* BS Soft LTD*, Vasily Klucharev,* Erasmus Rotterdam University

The school is dedicated to the latest achievements of cognitive neurobiotechnology (Brain-Computer Interfaces, Neuromarketing, etc.). The main purpose of schools is to show the participants of the innovation sequence: from the creation of neurotechnology to their effective use and implementation. The priority for the school is identifying promising areas and projects in the area of cognitive neuroscience, discussing the latest trends in modern biotechnology.
The school aims at training graduate students in neuroscience, as well as of interest to research groups working in the field of innovative biotechnology and commercial companies interested in effectively using these technologies.
School participants get acquainted with modern neurobiotechnology, as well as the skills necessary for successful implementation of innovative technologies. In general, the school aims to draw public attention to the effective use of promising Russian developments.
School is held with participation of leading specialists from Russia, Finland, France, Germany and the Netherlands.

BioN School: "Neurobiology and new approaches to artificial intelligence and brain" September, 5-9, 2011
fep.tti.sfedu.ru/russian/conferenc/brain/brain.htm

Place & organizers: Rostov-on-Don, *Evgeny Aydarkin, Marina Pavlovskaya*, Southern Federal University

In the frame of the school BioN organized a seminar for academic staff **"Modern Teaching Methodology"** which presented up-to-date techniques effectively implemented in higher education: interactive seminars, web-education, journal clubs, electronic textbooks and databases.

School in Neurotechnologies 2011: "Towards neuromorphic intelligence: experiments, models and technologies" October 3-7, 2011
www.school2.neurobiotech.ru/

Place & organizers: Nizhny Novgorod, *Viktor Kazantsev, Susanna Asatryan,* Nizhny Novgorod State University

The school is focused on one of the most exciting fields of modern neuroscience research: developing models, methods and technologies to create neuromorphic systems. These are the systems that mimic the morphology and functional activity of brain networks from the level of molecular cell signalling to the formation of higher cognitive functions such as memory, consciousness and intelligence. However, the exact mechanisms of intracellular signalling and interactions between individual cells in the neuronal networks of the brain necessary for adaptive behaviour at the level of whole organism is still poorly understood. Understanding these processes will not only enable us to develop new methods of diagnostics and treatment of brain pathology, but also will allow to create a fundamentally new type of devices based on the information dynamics of the brain – neuromorphic intelligence. Creation of neuromorphic systems would require the use of convergent technologies and interdisciplinary scientific approach based on the advances of various fields of science spanning from molecular neurobiology to novel engineering solutions in robotics.

The school is divided into three main sections:

- Modern concepts of the mechanisms of information representation, transfer and processing in the brain.
- Neuromorphic mathematical models: from molecular changes to the network and system organization.
- Neurohybrid and supercomputing technology: neuroelectronic interfaces and neuroanimates, brain-computer interfaces.

Each section has lectures by the leading scientists, seminars organized by the school staff, poster and oral presentations by the students

School in Neurotechnologies 2012 Neurogenetics. Unraveling behavior and brain mechanisms using modern technologies. August 21-25, 2012
http://school4.neurobiotech.ru/en

Place & organizers: Zvenigorod (Moscow district), *Victoria Moiseeva* (Lomonosov MSU), *Pavel Balaban and Konstantin Anoknih* (IHNA RAS), *Ivan Pavlov* (UCL, London).

The advances of molecular genetics have revolutionised the field of modern neuroscience. The availability of novel methods and techniques has allowed to bridge cellular and molecular neurophysiology with behavioural and cognitive neurobiology. The rapid development of new technologies constantly adds to the toolbox used by neuroscientists to unravel the mysteries of the brain. Neurogenetics has provided invaluable insights into the mechanisms of neurological disorders and cognitive dysfunctions. The primary focus of the school is on the neurogenetics of behaviour and cognition. Students are provided with an overview of the genetic tools available in neuroscience research and discuss the benefits and caveats of using different model organisms. Several lectures also concentrate on the translational aspects of neurogenetics research. In addition, issues related to the ethics of scientific research are discussed.

Topics of the school:

- Genetic tools to study cellular functional genomics: *molecular genetics, viral transfections, optogenetics, candidate genes approach.*
- Model organisms for behavioral genetics: genetic models in behavioural studies - mouse genetics, drosophila, zebrafish, nematode as model organisms.
- Behavior, emotion and cognition: neurogenetic markers of behavioral plasticity, neurogenetic markers of synaptic plasticity regulation, stress biology, genetics and emotional behavior.
- Mechanisms of neurological diseases and mood disorders: neurogenetics of neurological disorders, neuropharmacology, environmental pollutants and neurodegenerative disease

III. Courses in Russian partner universities

The courses offered to PhD students aim to introduce advanced contemporary topics in neuroscience research to Partner Universities' curriculum. These courses will help to integrate and sustain BioN curriculum within Russian Universities. Courses involve more than one speaker (invited speakers are encouraged) and *based on the research activity* of the institution.

Each Russian Partner University provides **intensive modular courses** specially developed for BioN curriculum[3].

Guidelines for intensive modular courses:

- Course duration 2-5 days. (Note: Courses are modular, i.e. short and intensive. It stimulates mobility and attracts students from other universities).
- Topics have to cover applied neuroscience, modern methods or the recent developments in neuroscience (Biotechnology is a priority of the BioN curriculum, see Annex I for BioN's scientific priorities).
- Two or more teachers have to be involved. **Note:** a team of teachers is BioN's priority.
- Preliminary date of the Course: within December 1, (2010) – April, 30 (2013)
- Involvement of the external Russian and EU lecturers is highly encouraged.

Teaching in English is encouraged (**Note:** teaching in English is not obligatory).

Feedback from students attended the course (participants) will be obligatory.

Note: The intensive modular courses will be coordinated through BioN to ensure there are no overlaps in schedule and students from other universities can attend. However, Russian partners are not limited in the number of courses they provide. We encourage Russian partners to offer more courses, announce them on BioN's web-pages and to make them as open as possible.

All courses or short lectures on the seminars and schools should be evaluated by students.[4]

[3] See example of modular course summary in **Annex III** and the course plan in **Annex IV**
[4] See forms for evaluation in the **Annex V**

Schedule for BioN modular course

Date	Title	Organizers	Days	Credits
17.11.2010	Psycho-neuro -physiology of conscience. Visual perception.	SFU, Lomonosov MSU	2	0,5
02.02.2011	Neurogenetics & Modern methods of behavior registration	Lomonosov MSU	4	2
24.02.2011	Neuroeconomics	Lomonosov MSU, SPbSU	3	1
21.03.2011	Genetic constructing in neurobiology	Lomachevsky NNSU	3	1
07.04.2011	Cellular mechanisms of information transfer: neuronal and synaptic plasticity	SPbSU, Ioffe PTI	3	1
10.05.2011	Neurophysiological mechanisms of perception	SFU, Kogan' Research Institute of Neurocybernetics	3	1
14.06.2011	Scientific Writing in English	Helsinki University, Lomonosov MSU	2	0,5
16.06.2011	Modern methods of higher mental functions studies in human by using of psychophysiological methods. Brain-computer interfaces.	Lomonosov MSU	3	1
14.09.2011	Background techniques for neurophysics: dynamical system theory, statistical physics, wavelet analysis	Ioffe PTI, SPbSU	4	1
19.10.2011	Noninvasive methodologies to study whole brain function (includes MEG, TMS, OI, fMRI)	SPbSU, MSUPE	4	1
30.11.2011	Synaptic Functions of Cell Adhesion and Extracellular Matrix Molecules	Lomachevsky NNSU, IIT	3	1
13.02.2012	Cellular neuroscience and optical methods of registration of neuronal activity	IHNA and Lomonosov MSU	3	1
26.04.2012	Scientific Writing in English II	Helsinki University, SPbSU	2	0,5
17.05.2012	Sleep and sleep disorders	SFU, SSC RAS	3	1
14.02.2013	Neuroeconomics 2013:	Klucharev V.	4	1

IV. Practical Placements in the EU universities

1-3 months practical placements (in EU research labs) are available for BioN students. Research laboratories of BioN's partners offer individual practical trainings in different fields of modern neurotechnologies:

University of Helsinki, Finland

Professor Kai Kaila's team investigates the biophysical, ion-regulatory and molecular mechanisms of neuronal communication and plasticity in the brain. Their research strategy is based on using a number of electrophysiological and molecular biological techniques on research models ranging from cloned receptors and isolated or cultured neurons to brain tissue slices, and to the human brain in vivo.

Medical Research Council, UK

MRC Cognition and Brain Sciences Unit's research uses techniques from experimental cognitive psychology, as well as new technologies for tracking the activity of the brain during language comprehension and production (fMRI, EEG, MEG). In our theoretical work we place emphasis on developing computational models of the cognitive processes involved in processing language. Much of the work also involves comparisons between different languages (cross-linguistic research) and studies of clinical populations. This latter group includes deaf patients fitted with a cochlear implant, and individuals with neuropsychological impairments.

University of Umeå

Ion Channels and Neuronal Signalling Group. Department of Integrative Medical Biology (IMB) research is mainly in the areas of neurobiology, myology and diabetes as well as endocytosis and exocytosis.

Italian Institute of Technology

Alexander Dityatev's team. The first assembly of neuronal networks is driven by genetic factors, i.e. by the size of the physiological targets and the expression of chemotactic and/or cell adhesion "recognition" proteins whose genes are specifically transcribed and translated by the various neuronal populations. Formation of synaptic connections during development and their modifications by experience are important steps in the wiring of the brain. These processes require molecular recognition cues - cell adhesion,

neurotrophins and extracellular matrix molecules – to guide interactions between the growth cones and environment, through which they navigate. Our research is aimed to identify functional roles of these molecules in specific subtypes of synapses and to use this knowledge for discovery of drug-like compounds capable to restore normal functions in animal models of autism, schizophrenia, epilepsy and obesity.

Ecole Normale Superieure de Paris

The Group for Neural Theory was founded in 2005 as part of the Département d'Etudes Cognitives (DEC) at the Ecole Normale Supérieure (ENS) in Paris. Since January 2009, we are also affiliated with the INSERM Unité 960 (Laboratoire de Neurosciences Cognitives). Our main research goal is to understand the basis of information processing in the brain by identifying links between neural dynamics and neural function. To that end, we investigate a broad range of topics in computational neuroscience, including models of probabilistic inference, feature integration, and statistical learning in neuronal architectures; models of drug addiction; models of spiking and non-spiking recurrent networks; models of short-term memory and decision-making; spike-based learning algorithms; short-term synaptic plasticity;

Roadmap for practical placements:

(1) register as a BioN students http://www.neurobiotech.ru/en/how_to_apply

(2) apply for practical placement at http://www.neurobiotech.ru/en/en_hta

(3) get an invitation from BioN partner

(4) get a n approval from your local BioN coordinator.

V. Methodological trainings

Selected PhD students and teachers are annually attend a 2 weeks hands-on training in biotechnological methodology of information processing

List of trainings- practical schools:

Summer School in computational neuroscience: "White Nights of Computational Neuroscience: Neurotheory from cell to cognition 2012"

http://school3.neurobiotech.ru

Saint Petersburg, Russia, June 4 – June 21, 2012

Place: Academical University and Saint Petersburg State University

Organizers: AU, SPbSU, ENS and Ioffe PTI

Computational neuroscience is a burgeoning field that has recently become central to study the brain. It is complementary and applicable in vast majority of neuroscience levels and approaches, form molecular neuroscience to cognitive science. The goal of the intensive research seminar in computational neuroscience is to bring world-class players in computational neuroscience to SPB, allow for organized lecture courses as well as informal interactions with the participants.

The extended duration and presence time of the lecturers is instrumental to fostering interactions. Detailed tutorials preceded each lecture introducing the cutting edge knowledge of computational techniques.

School language: English

Teaching methods: tutorials, lectures, workshops, the mastering of mathematical methods in neuroscience modeling.

Methodological school:

Methods of data processing in EEG and MEG. Applied aspects of magneto-and electroencephalographic neuroimaging

http://www.neurobiotech.ru/en/MEG_school

Location: Moscow State University of Psychology and Education (MSUPE), Moscow, Russia

Organizers: MSUPE, SPbSU and Lomonosov MSU

Recently there has been a growing interest of scientists to study the processes taking place in certain areas and between different areas of the brain. The research field of brain connectivity has attracted experts from different specialties. And the methods of electroencephalography (EEG) and magnetoencephalography (MEG) have become the center of attention due to its high temporal resolution.

Our school will consist of lectures and workshops on processing of EEG and MEG data with leading experts in research on the brain connectivity.

As a result of the school, participants will receive the latest knowledge about the methods of the dynamic mapping of brain activity by analysis of multichannel MEG and EEG. Knowledge of modern methods of neuroimaging of the brain allows a wide range of expert biologists, physicians, psychologists, linguists, physicists, and many others to improve their skills as researchers in the field of neuroscience and biomedicine.

School language: English and Russian. Slides in English and Russian.

Teaching methods: lectures, workshops, discussions and review of the literature, and the mastering of mathematical methods and the latest software.

Annex I

BioN's scientific priorities:

1. Neurogenetics
2. Computational neurosciences
3. Advanced Data processing - advanced skills in data processing
4. Machine learning techniques in Neuroscience
5. Brain Imaging
6. Neuroscience of psychiatry disorders
7. Applied Neuroscience:
    - BCI - Brain Computer interfaces – Hot topic
    - Neurofeeback – correction of behavior
    - Neuromonitoring – monitoring of mental functions: anesthesia, concentration of pilots dispatchers
    - Neuro-prosthesis, e.g. cochlear implants, artificial vision.
8. Electrophysiology *in vivo* and *in vitro*
9. Imaging brain tissue *in vitro* (ion-selective and voltage-sensitive dyes)
10. Model organisms in neuroscience research
11. Use of viral transfection techniques
12. Optogenetics: new field in biomedical research
13. Functional Connectivity: combining immunohystochemistry, electrophysiology and structure reconstruction
14. Modeling disease *in vivo* and *in vitro*

Note: the aforementioned topics are just possible directions that may be pursued by the BioN. Whilst some of the topics are represented in Russian Partner institutions, others are not and we may invest in developing them. We welcome your creative suggestions on which directions would make our educational programme stronger.

Annex II

Abbreviations of Institutions – members of the BioN consortium

Russian Partners:

AU	Academic University, Saint-Petersburg
IHNA	Institute of Higher Nervous Activity and Neurophysiology of Russian Academy of Science, Moscow
Ioffe PTI	Ioffe Physico-Technical Institute of Russian Academy of Science, Saint Petersburg
Lobachevsky NNSU	Lobachevsky Nizhny Novgorod State University
Lomonosov MSU	Lomonosov Moscow State University
MSUPE	Moscow State University of Psychology and Education
SFU	Southern Federal University, Rostov-on-Don
SPbSU	Saint Petersburg State University

European Union Partners:

HU	University of Helsinki, Finland
MRC-CBU	Medical Research Council - Cognitive Brain Unit, UK
UmU	University of Umeå, Sweden
IIT	Italian Institute of Technology, Genoa, Italy
ENS	Ecole Normale Superieure de Paris, France

Annex III

Sample summary of BioN modular intensive course.

Title of the course	**Neuroeconomics**
Summary of the course	Economics, psychology, and neuroscience are converging today into a unified discipline of Neuroeconomics with the ultimate aim of providing a single, general theory of human behaviour. Neuroeconomics provides social scientists and future managers with a deeper understanding of how they make their own decisions, and how others decide. How is an optimal decision programmed by the brain? Is it possible today to predict the purchasing intentions of a consumer looking to his brain activity? Are we hard-wired to be risk-adverse or risk-taker? What is the evolutionary background of our economic behaviours? All these questions are addressed by neuroeconomics. The course will start by discussing the history of neuroeconomics and the anatomy of the brain (Module I: "How the brain works"). Module II ("How the brain decides") then focuses on the core building block of neuroeconomics: decision theory. In a simple way, you will be presented with the main theories accounting for how individuals decide, supported by key empirical studies. The next module will study the balance between rationality and emotions (Module III: "How the brain feels"): how our emotions interfere with our so-called rational judgments. Module IV ("Society of brains") focuses on society: how groups and the social environment interact with individual decision-making. This module will have strong implications for marketing, public policy and public education. Finally, the evolutionary dimensions of brain research will be discussed in the last section (Module V).
Date	February 2011
Teachers	1. V. Klucharev (Erasmus University) 2. A. Shestakova (SPbU) 3. N. Chernitsov (SPbU)
Location	Lomonosov MSU
Invited EU lectures	(Erasmus University)
I will submit the detailed plan for the course by September, 7	YES

Annex IV

Sample Plan (Manual) for BioN intensive modular course.

Course: Background techniques for neurophysics: dynamical system theory, statistical physics, wavelet analysis

Credits: 1.00

Date: 14.09.2011-17.09.2011

Organizers: Ioffe' PTI, SPbU

Coordinator: Anton Chizhov

Speakers: A. Chizhov, S.V. Bozhokin, A.V. Gorbatyuk, R.R. Aliev

Minimal requirements:

Students are expected to have basic knowledge of mathematics and physics on the level of technical universities as well as an understanding of electrical properties of excitable membranes.

Language: Russian/English

Summary:

The models of computational neuroscience borrow ideas and methodology from physics and mathematics. Current course gives some introduction into the dynamical system theory, statistical physics, wavelet analysis and gives examples of application of these techniques for the analysis of single neuron models and derivation of neuronal population models.

Lecture 1 “Introduction into the models of single neurons and neuronal populations” (A.V. Chizhov)

Lectures 2-4 “Introduction into the dynamical system theory” (A.V. Gorbatyuk)

Lectures 5-6 “Introduction into nonequilibrium statistical physics” (S.V. Bozhokin)

Lectures 7-8 "From thermodynamics to a nonlinear distributed neural tissue" (R.R.Aliev)

Lecture 9 “Model of single neuronal population” (A.V. Chizhov)

Lectures 10 “Introduction to wavelets” (R.R. Aliev)

Lectures 11-12 “Wavelet analysis” (S.V. Bozhokin)

Duration (days): 4

Learning outcomes:

Students will learn about the basic techniques applied in the dynamical system theory, statistical physics and wavelet analysis, which may provide a base for their future development of the theory of brain modeling.

Place: 90 Auditorium of SPbU

Web link to on-line broadcast: to be announced.

Annex V

Course Evaluation Form

Teacher/*Лектор* _____

Course/Lecture _____
Курс/Лекция

Date/*Дата* _____

Completion of this questionnaire is voluntary. You are free to leave some or all questions unanswered.
Answers on this questionnaire help us to improve the program quality.
Заполнение вопросника необязательно. Вы можете не отвечать на все вопросы.
Ответ на вопросник поможет нам улучшить качество программы.

		5 Excellent *отлично*	4 Very good *Оченьхорошо*	3 Good *хорошо*	2 Fair *удовлетворительно*	1 Poor *плохо*	0 Very poor *Оченьплохо*
1	Overall impression *Оценка курса/лекции в целом*						
2	The course content *Содержание курса*						
3	Course organization *Организация курса*						
4	Lecturer'sability to communicate scientific concepts *Объяснение материала лектором*						
5	Quality of presentation material *Использование лектором наглядных примеров и иллюстраций*						
6	In your opinion how important are the scientific questions covered in the course/lecture *Актуальность вопросов, затронутых лектором*						
7	Student confidence in lecturer's knowledge *Доверие студентов к уровню знаний лектора*						
8	Lecturer's enthusiasm *Энтузиазм лектора*						
9	Stimulation of students' interaction and participation *Поощрение лектором студентов для их самовыражения и активного участия*						
10	Ability to answer questions *Ответынавопросыстудентов*						
11	Availability of extra help when needed *Помощь студентам со стороны лектора*						
12	Time management *Использование лекционного времени*						
13	Lecturer's interest in whether students have learned the material *Заинтересованность лектора в том, как*						

	студенты усвоили материал						
14	Amount you learned in the course *Количество материала, усвоенного вами в течение курса*						
15	Relevance and usefulness of course content *Обоснованность и полезность материала курса лично для вас*						

Relative to other courses you have taken:
Относительно других курсов, прослушанных вами

		Much higher *Гораздо выше*	**Higher** *Выше*	**Average** *Средний*	**Lower** *Ниже*	**Much lower** *Гораздо ниже*	**0**
17	The intellectual challenge presented by the course/lecture *Сложность материалов курса*						
18	The workload *Ваша нагрузка (включая посещение лекций и самостоятельную работу)*						

	Hours/*часы*	**1-2**	**2-4**	**4-8**	**8-12**	**12-16**	**16-20**
19	On average, how many hours have you spent on this course, including attending classes, reading, reviewing notes, writing papers etc.? *В среднем как много часов вы потратили на курс, включая посещение лекций, самостоятельное чтение, ведение конспектов, проверочные работы и другую связанную с курсом активность*						
20	From the total amount of course lectures, how many did you attend? *Скольколекцийвыпосетилиизвсегокурса?*						

Is it necessary for your personal program of education to attend on this course?
Обязателен ли курс для вашей личной программы обучения?

Yes/*да* ☐ No/*нет* ☐

N/A ☐
Затрудняюсь ответить

Other comments/ другие комментарии

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For information and support please contact:

Olga Martynova
BioN Secretary
Postgraduate Training Network in
Biotechnology of Neurosciences BioN
Tel: +7 926 836 55 93
Email: bion@neurobiotech.ru
www.neurobiotech.ru