Short Methods Courses & Method Seminars; Extended Methods Course

Mar-Aug 2011 (A)

* Course will also be offered in the next course announcement (Sep 2011 - Feb 2012)
*? Course might be offered again in the next course announcement (to be confirmed)

Department/Group	Supervisor(s)	ID	*	Title of Course	Credits	Date
Biochemistry						
Fischle, Wolfgang	Winter, Stefan / Kost, Nils	A 75	*	Chromatin Immunoprecipitation (CHiP)	1,0	May 2011
Görlich, Dirk	Frey, Steffen	A 80	*	Advanced bacterial protein expression and purification	1,0	12-13 May 2011
Höbartner, Claudia	Höbartner, Claudia	A 32	*	Chemical synthesis and enzymatic ligation of RNA and DNA oligonucleotides	1,0	18-19 May 2011
Jahn, Reinhard	van den Bogaart, Geert / Park, Yongsoo	A 33	*	Reconstitution of neuronal exocytosis	1,0	4-5 Apr 2011
Jahn, Reinhard	Chua, John / Binotti, Beyenech / Boyken, Janina	A 35	*	Co-immunoprecipitation as a technique to study protein-protein interactions	1,0	16-18 Mar 2011
Jahn, Reinhard	Kühnel, Karin	A 36	*	Protein purification and characterization	1,0	9-10 Jun 2011
Lührmann, Reinhard	Hartmuth, Klaus	A 82	*	Affinity purification methods for the isolation of large heterogeneous macromolecular assemblies	1,0	29-31 Mar 2011
Lührmann, Reinhard	Hartmuth, Klaus	A 93	*	The application of RNA structure determination methodology to the analysis of RNA-protein interactions in RNP complexes	1,5	18-20 May 2011
Rehling, Peter	Reinhold, Robert	A 53		Blue-native PAGE analysis of membrane protein complexes	1,0	tba
Rehling, Peter	Vukotic, Milena	A 91		Activity measurements of respiratory chain enzymes	0,5	tba
Rehling, Peter	Deckers, Markus	A 92	*	Subcellular fractionation	0,5	tba
Rodnina, Marina	Milon, Pohl	A 81	*	Introduction to transient kinetic methods	1,0	11-12 Apr 2011
Schmitt, Hans Dieter	Schröter, Saskia	A 34	*	BiFC (bimolecular fluorescence complementation) in yeast	1,0	Apr 2011
Tittmann, Kai	Piontek, Alexander / Schneider, Stefan	A 64	*	Principles and methods of protein purification by chromatography	1,0	28-29 Mar 2011
Tittmann, Kai	Meyer, Danilo / Sitte, Astrid	A 71	*	Thermodynamic characterization of biomolecular interactions by isothermal titration calorimetry	1,0	31 Mar - 1 Apr 2011

Urlaub, Henning	Atanassov, Ilian / Hofele, Romina / Karaca, Samir / Qamar, Saadia	A 65	*	Sequence analysis of proteins and their post-translational modifications by MALDI-ToF and electrospray ionization (ESI) mass spectrometry	1,0	23-25 Mar 2011
Walter, Lutz	Walter, Lutz / NN	A 66	*	Isolation of recombinant proteins by affinity chromatography and binding studies	1,0	9 Mar 2011
Wintermeyer, Wolfgang	Wintermeyer, Wolfgang/ Draycheva, Albena	A 105		Equilibrium studies of protein-ligand interactions using fluorescence techniques	1,0	16-17 May 2010

Molecular Biology & Genetics

Brenig, Bertram	Schütz, Ekkehard	A 06	*	Genotyping using FRET on the LightCycler	1,0	Jun/Jul 2011
Brenig, Bertram	Brenig, Bertram	A 07	*	Fragment analysis and Sanger DNA sequencing using the ABI3100	1,0	Jun/Jul 2011
Dobbelstein, Matthias	Schulz, Ramona / Schmidt, Franziska	A 10	*	Assessing promoter activity by luciferase assays	1,0	Mar 2011
Dobbelstein, Matthias	Keitel, Ulrike / Holembowski, Lena	A 11		Polymerase Chain Reaction I and advanced applications	1,0	5-6 May 2011
Fischer, Andrè	Stilling, Roman / Agbemenyah, Hope / Bahari Javan, Sanaz	A 84	*	Chromatin-immunoprecipitation and epigenomic gene-profiling in the adult brain	1,0	tba
Görlich, Dirk	Frey, Steffen	A 77	*	PCR: self-made enzymes, helpful additives and insights into the reactions	0,5	10 May 2011
Jakobs, Stefan	Grotjohann, Tim / Brakemann, Tanja	A 37	*	PCR based mutagenesis strategies to evolve (photoswitchable) fluorescent proteins	1,0	12-13 Apr 2011
Walter, Lutz	Gruber, Jens	A 68	*	Mechanisms of RNA silencing	1,0	May 2011

Cell Biology & Microbiology, Imaging

Eimer, Stefan	Hegemann, Jan / Kittelmann, Maike / Wiechmann, Carolin	A 110		High Pressure Freeze Electron Microscopy on its way to Correlative Microscopy and 4D EM	2,0	18-22 Jul 2011 or 25-29 Jul 2011
Görlich, Dirk	Kadian, Chandini	A 79		Permeabilized cell assays for studying intracellular protein transport	0,5	tba
Kehlenbach, Ralph	Kehlenbach, Ralph	A 39	*	Analysis of nucleocytoplasmic transport by flow cytometry	0.5	Jul 2011
Nave, Klaus-Armin	Möbius, Wiebke	A 44	*	Subcellular localization of proteins by immunoelectron microscopy of cryosections	1,0	9-10 May 2011
Olympus / Bodenschatz	Schmidt, Helge	A 46/I	*	Theory and basics of fluorescence microscopy and imaging / Introduction to life science research applications FRET, FRAP, FLIM, caging–uncaging, GFP, Fluorescence microscopy of living cells	1,0	18/20 Jul 2011

Olympus / Bodenschatz	Schmidt, Helge	A 46/II	*	Theory and basics of fluorescence microscopy and imaging / Introduction to life science research applications FRET, FRAP, FLIM, caging–uncaging, GFP, Fluorescence microscopy of living cells	1,0	19/21 Jul 2011
Developmental Biology, Anatomy & Histology						
Borchers, Annette	Wehner, Peter	A 04		Imaging of migrating neural crest cells	1,0	3-4 Mar 2011
Eichele, Gregor	Miletic, Helena	A 13	*	Mouse histology & *in situ* expression analyses	1,0	9-10 May 2011
Hahn, Heidi	Nitzki, Frauke	A 28		*In situ* hybridization of paraffin embedded tissue sections	1,0	4-6 Apr 2011
Oster, Henrik	Oster, Henrik	A 47	*	Real-time luminescence recording and imaging	1,0	9 & 13 May 2011
Shcherbata, Halyna	Shcherbata, Halyna	A 56		Introduction to basic histology techniques	1,0	3-18 Mar 2001 or 4-11 Apr 2011
Stadelmann-Nessler, Christine	Stadelmann-Nessler, Christine	A 60	*	Non-radioactive in situ hybridization	1,0	Mar/Apr 2011
Wimmer, Ernst / Bucher, Gregor	Wimmer, Ernst / Bucher, Gregor	A 108	*	Homologs and Paralogs – how they evolve and how to distinguish them	0,5	1 Jul 2011
Vertebrate Animal Models						
Bähr, Mathias	Lingor, Paul	A 01	*	Introduction to animal experiments	0,5	5 Apr 2011
Bayer, Thomas A.	Wirths, Oliver	A 02	*	Alzheimer's disease: Behavioural and neuropathological analysis of transgenic mouse models	1,0	27-28 Jun 2011
Brembeck, Felix	Thiede, Nadine	A 05	*	Basic anatomy of genetically engineered mouse models	0.5	Apr/May 2011
Brembeck, Felix	Thiede, Nadine	A 107	*	Tissue processing and immunohistochemistry on tissue sections of genetically engineered mouse models	1,0	Apr/May 2011
Molecular & Cellular Neuroscience, Electrophysiology						
Fiala, Andrè / Göpfert, Martin	Fiala, Andrè / Göpfert, Martin	A 83	*	Drosophila Neurogenetics	1,0	7-9 Apr 2011
Nave, Klaus-Armin	Roßner, Moritz	A 45	*	Microdissection combined with RNA analysis in the brain	1,0	23-25 Mar 2011
Rhee, JeongSeop	Rhee, JeongSeop	A 96	*	Nerve cell culture and patch-clamp recordings from nerve cells	1,0	21-22 Mar 2011
Rizzoli, Silvio	Kamin, Dirk / Denker, Annette	A 89	*	High resolution microscopy in synapses	1,0	31 May - 1 Jun 2011

Stoykova, Anastassia	Paul, Vanessa	A 87		Neurosphere cultures from embryonic mouse brain	1,0	Mar 2011 (2nd half)
Stühmer, Walter	Pardo, Luis	A 63	*	Patch clamp	1,0	4-6 Apr 2011

Theoretical, Systems & Behavioral Neuroscience

Antal, Andrea	Strenzke, Nicola / Hoch, Gerhard	A 41	*	Auditory and visual evoked potentials	1,0	Apr 2011
Ehrenreich, Hannelore	Begemann, Martin / Bartels, Claudia	A 12	*	Translational Neuroscience: **(A) Schizophrenia, (B) Multiple Sclerosis**	.0 / module	17-19 Jun 2011
Fischer, Julia	(A) R Jürgens, B Wheeler, (B) T Price, P Maciej	A 17	*	Introduction to bioacoustic field methods: from recording to statistics	1,0	6-8 Apr 2011
Gail, Alexander	Glaser, Beatrix	A 73	*	Introduction to Matlab in Systems Neuroscience	1,0	13/20/27 May 2011
Geisel, Theo / Nagler, Jan / Timme, Marc / Kielblock, Hinrich	Geisel, Theo / Nagler, Jan / Timme, Marc / Kielblock, Hinrich	A 20		Stochastic processes in physics and biology	1,0	SS 2011, Wed
Geisel, Theo / Timme, Marc / Wolf, Fred	Geisel, Theo / Timme, Marc / Wolf, Fred	A 22		Theoretical and Computational Neuroscience: Collective Dynamics Biological Neural Networks II	1,0	SS 2011, Fri

Structural Biology

Bennati, Marina	Türke, Maria Teresa / Tkach, Igor / Argirevic, Tomislav	A 03	*	EPR-Spectroscopy	1,5	22-24 Mar 2011
Ficner, Ralf	Neumann, Piotr	A 103	*	X-ray crystallography	2,5	21-25 Mar 2011
Grüne, Tim	Grüne, Tim	A 106		Advanced macromolecular crystal structure determination	2,0	14-18 Mar 2011
Pena, Vlad	Schmitzova, Jana / Steuerwald, Ulrich / De, Inessa / de Moura, Tales / Wawrzinek, Jürgen	A 102	*	Crystallization of biological macromolecules	1,0	6-7 June 2011
Stark, Holger	Platzmann, Florian	A 61	*	3D structure determination of macromolecular complexes by single particle cryo-EM	1,0	Mar/Apr 2011

Biophysics, Bioinformatics and Statistics

Friede, Tim	Konietsche, Frank / Lange, Katharina	A 100	*	Basic statistics for graduate students in the life sciences	1,0	4/5/7/8 Apr 2011
Grubmüller, Helmut	Peters, Jan Henning	A 24		Introduction to molecular dynamic simulation	1,0	SS 2011

Grubmüller, Helmut / de Groot, Bert	Grubmüller, Helmut / de Groot, Bert	A 27		Computational Biophysics II	1,5	SS 2011, Mon
Grubmüller, Helmut / Schmidt, Christoph F.	Grubmüller, Helmut / Schmidt, Christoph F.	A 25	*	Current Topics in Biophysics – Lecture Series	1,0	SS 2011, Fri
Hoff, Katharina	Hoff, Katharina	A 94	*	Introductory biostatistics with R	1,0	2-4 Mar 2011
Hoffmann, David / Mittner, Matthias / Jahnke, Sven	Hoffmann, David / Mittner, Matthias / Jahnke, Sven	A 109		Matlab and Python programming introductory course	2,0	14-18 Mar 2011
Köster, Sarah	Schwarz, Sarah	A 76		Traction Force Microscopy	0,5	11 May 2011
Lapp, Tobias / Neudecker, Max /Boekhoff, Sven	Lapp, Tobias / Neudecker, Max / Boekhoff, Sven	A 97	*	Image Processing with ImageJ and MATLAB / Octave	0,5	5 May 2011
Steinem, Claudia / Janshoff, Andreas	Mey, Ingo / Saßen, Christoph	A 62	*	Scanning Ion Conductance Microscopy, a versatile tool to study surfaces and surface properties	1,0	4-5 Apr 2011
Steinem, Claudia / Janshoff, Andreas	Behn, Daniela	A 72	*	Surface Plasmon Resonance: basic principles and applications	1,0	11-12 Apr 2011
Stühmer, Walter	Mitkovski, Mišo	A 98	*	Introduction to image processing in biology with ImageJ	0,5	7-8 Apr 2011
Walter, Lutz	Brameier, Markus	A 67	*	Introduction to Bioinformatics Methods	1,0	Apr 2011

Extended Methods Courses

Tittmann, Kai	Golbik, Ralph / Kühnel, Karin / Lange, Adam / Urlaub, Henning	E 02		Bioanalytics	4,0	30 May - 10 Jun 2011
Stühmer, Walter / Hörner, Michael / Schlüter, Oliver	Stühmer, Walter / Hörner, Michael / Schlüter, Oliver	E 03		ENI Electrophysiology Training (ENI-ELECTRAIN)	4,0	9-20 May 2011

Course ID: A 01 **Credits:** 0.5 **Date:** 5 April 2011

Title of Course: Introduction to animal experiments

Group Leader / Supervisor(s): Paul Lingor, Mathias Bähr

Place: S2 Lab, Waldweg 33, Basement

Participants: min: 2 max: 6

Duration: 1 day Time on Day 1: 09:00 h

Preparatory Meeting: No

Course description:

Animal models are widely used in the life sciences, medical research and especially neuroscience. They are used to study the etiology of various diseases as well as experimental treatment methods. In this course we will give an overview on what is considered an animal experiment and why animal experiments are necessary. We will discuss the strict prerequisites preceeding experiments on life animals and study the possibilities to reduce harm to research animals.

In the second part, students will have the possibility to follow a surgical intervention on animals within an ongoing research project depending on the current research activity in our lab. Special emphasis will be given to proper anaesthesia of the animal. We will demonstrate interventions on the optic nerve in Wistar rats, such as axotomy, optic nerve crush or intravitreal injections. Students will then perfuse the animals and remove the eye, optic nerve and brain to completely fix it. Then, the students can prepare the eye ball for sectioning or can remove the retina and whole mount it for immediate examination. Finally, we will discuss the methods to evaluate the experimental results obtained.

Contact 1:	PD Dr. Paul Lingor	plingor@gwdg.de	Tel. 0551-39 4927
Contact 2:			

Comments:

Course ID:	A 02	**Credits:**	1.0	**Date:**	27-28 June 2011

Title of Course: Alzheimer's disease: Behavioural and neuropathological analysis of transgenic mouse models

Group Leader / Supervisor(s): Thomas Bayer, Oliver Wirths

Place: Molecular Psychiatry Lab, Dept. of Psychiatry, von-Siebold-Str. 5, Basement

Participants: min: 2 | max: 4

Duration: 2 days | **Time on Day 1:** 09:30 h

Preparatory Meeting: No

Course description:

Transgenic mouse models have been proven to be valuable research tools to facilitate our understanding of the pathological alterations in Alzheimer's disease (AD) and are indispensable in the development of new therapeutic treatment strategies.

Students will be introduced to different AD mouse models, will prepare brain tissue for histochemical analyses and will carry out immunostainings for relevant neuropathological markers. In addition, they will be introduced into mouse behavioural experiments and will learn to conduct simple motor and learning performance tasks.

Contact 1:	Dr. Oliver Wirths	owirths@gwdg.de	Tel. 0551-39 10290
Contact 2:			

Comments:

Course ID:	A 03	**Credits:**	1.5	**Date:**	22-24 March 2011

Title of Course: EPR-Spectroscopy

Group Leader / Supervisor(s): Marina Bennati, Maria Teresa Türke, Igor Tkach, Tomislav Argirevic

Place: Max-Planck-Institut für biophysikalische Chemie, AG Elektronenspinresonanz-Spektroskopie, Am Fassberg 11

Participants: min: 2 | max: 6

Duration: 3 d | **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Investigation of protein structure by EPR spectroscopy and site directed spin labeling.

Contact 1:	Dr. Igor Tkach	igor.tkach@mpibpc.mpg.de	Tel. 0551 201-1004
Contact 2:	Maria Teresa Türke	mtuerke@gwdg.de	Tel. 0551-201 1380

Comments: Basic knowledge in spectroscopy is required

Course ID:	A 04	**Credits:**	1.0	**Date:**	3-4 March 2011

Title of Course: Imaging of migrating neural crest cells

Group Leader / Supervisor(s): Annette Borchers, Peter Wehner

Place: Dept. of Developmental Biochemistry, Ernst-Caspari-Haus / GZMB building, Justus-von-Liebig-Weg 11

Participants: min: 2 | max: 2

Duration: 2 d

Time on Day 1: 09:00 h

Preparatory Meeting: No

Course description:

In this course you will learn to work with the model organism *Xenopus laevis* the African clawed frog. You will learn how to inject their embryos and for the experimental setup we will do this with RNA coding for fluorescently labeled proteins.

Neural crest migration will be analyzed by explantation of fluorescent neural crest cells on fibronectin to monitor migration by time-lapse imaging. Additionally the neural crest migration will be analyzed by transplanting fluorescent neural crest cells into control embryos and time permitting monitoring their migration.

Contact 1:	Dr. Annette Borchers	annette.borchers@gmail.com	Tel. 0551-39 14607
Contact 2:			

Comments: http://www.uni-goettingen.de/en/57917.html

Course ID: A 05 **Credits:** 0.5 **Date:** April/May 2011

Title of Course: Basic anatomy of genetically engineered mouse models

Group Leader / Supervisor(s): Felix H. Brembeck, Nadine Thiede

Place: UMG, University Hospital, Research Laboratory "Tumor Biology and Signal Transduction", Dep. Hematology/Oncology, Room 1D4 681

Participants: min: 2 max: 6

Duration: 1 day **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

Genetic mouse models are widely used to study gene function during development or in the initiation or progression of tumors. Our laboratory is analyzing different genetic tumor models to analyze early organ development and the development of intestinal and breast cancer.

Participants of this course will have the opportunity to perform a complete necropsy of genetically engineered mice. They will gain insight in the gross anatomy of internal organs and how to dissect, fix and prepare them for subsequent analysis.

Contact 1: Prof. Dr. Felix H. Brembeck | brembeck@med.uni-goettingen.de | Tel. 0551-39 10568

Contact 2: Nadine Thiede | thiede@med.uni-goettingen.de | Tel. 0551-39 10568

Comments:

Course ID:	A 06	**Credits:**	1.0	**Date:**	Jun/Jul 2011

Title of Course: Genotyping using FRET on the LightCycler

Group Leader / Supervisor(s): Bertram Brenig, Ekkehard Schütz

Place: Institute of Veterinary Medicine, Burckhardtweg 2, 37077 Göttingen

Participants: min: 2 | max: 4

Duration: 2 days | **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Participants will understand the chemical and physical background of FRET in the context of nucleic acid hybridization. The special case of hybridization probes that lead to FRET will be shown and the prediction of assay performance will be shown. Real-time PCR with fluorescence monitoring of probe melting curves for detection of variants in genes, such as single nucleotide polymorphisms and different techniques of multiplexing are given as examples and the value of *in silico* design of probes is shown.

The beneficial use of well parameterized model calculations for molecular haplotyping with loci-spanning probes will be discussed.

Contact 1:	Dr. Ekkehard Schütz	eschuetz@mac.com	Tel. 0551-39 13964
Contact 2:			

Comments:

Course ID:	A 07	**Credits:**	1.0	**Date:**	Jun/Jul 2011

Title of Course: Fragment analysis and Sanger DNA sequencing using the ABI3100

Group Leader / Supervisor(s): Bertram Brenig

Place: Institute of Veterinary Medicine, Burckhardtweg 2, 37077 Göttingen

Participants: min: 2 | max: 4

Duration: 3 days | **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Fragment analysis is an important methodology in spieces identification, parentage control, forensic medicine, and other applications, e.g. QTL studies. In most cases highly variable regions of a genome (microsatellite, SRS) are amplified and then subjected to gel-/or capillary electrophoresis.

Participants will be introduced to and perform PCR protocols for the amplification of microsatellite markers (multiplex reactions). Amplicons will be analysed on an ABI3100 Genetic Analyzer and profiles evaluated.

Contact 1:	Prof. Bertram Brenig	bbrenig@gwdg.de	Tel. 0551-39 3383
Contact 2:			

Comments:

Course ID:	A 10	**Credits:**	1.0	**Date:**	March 2011

Title of Course: Assessing promoter activity by luciferase assays

Group Leader / Supervisor(s): Matthias Dobbelstein, Ramona Schulz, Franziska Schmidt

Place: Department of Molecular Oncology, Ernst-Caspari-Haus / GZMB building, Justus-von-Liebig-Weg 11

Participants: min: 3 | max: 6

Duration: 2 days **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

Reporter assays are commonly used to determine the activity of a promoter and in particular its response to specific transcription factors. Luciferase reporters provide a particularly wide linear range and can therefore be used to quantify the activity of weak and strong promoters with accuracy. The use of different luciferase species allows the determination of two different promoter activities simultaneously, e. g. to provide an internal control.

On the first day, we will discuss the opportunities and limitations of transient reporter assays, and we are going to transfect cells with combinations of reporter plasmids and expression plasmids for transcription activators. On the second day, we are going to determine luciferase activities (firefly and renilla) using a dual assay, by semi-automated luminometry. The results will be discussed and different modes of measurement will be explained. Participants are welcome to bring their own promoter constructs if desired, but a brief discussion in advance would be helpful.

Contact 1:	Ramona Schulz	rschulz1@gwdg.de	Tel. 0551-39 3574
Contact 2:	Franziska Schmidt	fschmid1@gwdg.de	Tel. 0551-39 13841

Comments: 2 days, each time starting in the morning

GGNB Short Methods Courses: March - August 2011

Course ID: A 11 **Credits:** 1.0 **Date:** 5-6 May 2011

Title of Course: Polymerase Chain Reaction I and advanced applications

Group Leader / Supervisor(s): Matthias Dobbelstein, Ulrike Keitel, Lena Holembowski

Place: Department of Molecular Oncology, Ernst-Caspari-Haus / GZMB building, Justus-von-Liebig-Weg 11

Participants: min: 4 max: 6

Duration: 2 days **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

Polymerase chain reaction and applications, trouble shooting, reverse transcription, oligonucleotide-directed mutagenesis, first steps towards quantitative PCR, DNA sequencing.

Contact 1:	Ulrike Keitel	ukeitel@gwdg.de	Tel. 0551-39 3574
Contact 2:	Lena Holembowski	lena.holembowski@online.de	Tel. 0551-39 3574

Comments:

Course ID: A 12 **Credits:** 2.0 / module* **Date:** 17-19 June 2011

Title of Course: Translational Neuroscience: **Schizophrenia**

Group Leader / Supervisor(s): Hannelore Ehrenreich, Martin Begemann, Claudia Bartels

Place: MPI for Experimental Medicine, Division of Clinical Neuroscience

Participants: min: 6 max: 18

Duration: 2 x 3 d* **Time on Day 1:** 08:00 h

Preparatory Meeting: No

Course description:

Target Group: Interdisciplinary approach, addressing medical students in the clinical part of their studies as well as students of biology and psychology at a progressed state of their studies (at least semester 5); all lectures will be in English.
General Outline: A total of 78 hours will be provided, covering translational neuroscience, presented in 2 blocks á 26 hours. Each block comprises a large area of translational neuroscience under the umbrella of one specific disease, thereby delivering an exemplary guideline for teachers and students: (1) Schizophrenia as an example of diseases affecting higher brain functions; (2) Multiple Sclerosis as an example of an inflammatory degenerative disease of the nervous system.

Content Block 1: Schizophrenia: Introduction to the disease, historical aspects, epidemiology, patient presentation (including videos), DSM criteria for the diagnosis, frequent comorbidities, including drug abuse and associated problems, important differential diagnoses, neuroimaging, neuropsychology, psychopathology, instruments for clinical rating of disease severity and follow-up (PANSS etc), established treatments, dopamine hypothesis of schizophrenia, novel approaches targeting the glutamate system and neuroprotection, genetics of schizophrenia, environmental risk factors, animal models (previous, present and future), behavioral battery focusing on testing higher brain functions in mice, magnetic resonance imaging (MRI), histology, and drug-challenge tests in experimental animals, long-term potentiation and short-term potentiation in the hippocampus, short-term plasticity, multi-electrode array (MEA) recordings, autaptic neuron preparation, multivariate covariance analysis as statistical means for evaluation of proof-of-concept trials.

Content Block 2: Multiple Sclerosis*:* Introduction to the disease, historical aspects, epidemiology, patient presentation (including videos), diagnostic criteria for disease classification including subtypes, imaging, neurophysiology, CSF diagnostics, neuropsychology, differential diagnoses and frequent comborbidities including psychopathology, pathophysiology including mediators of inflammation, mechanisms of axonal loss, demyelination, immunology including auto-immunity, basics of the functioning of the blood-brain-barrier and the brain immune system, genetics, environmental risk factors, animal models of multiple sclerosis and animal neuroimaging, mouse test battery for measuring motor function, fine motor performance and ataxia, therapeutic targets, established and experimental therapeutic approaches including symptomatic/supportive measures, the drug development process (clinical trials) and its challenges in multiple sclerosis.

Contact: Prof. Dr. Dr. H. Ehrenreich | timner@em.mpg.de | Tel. 0551-3899 615

Comments:
* 2 blocks of 3 days each in June and November, Friday through Sunday
Written test (multiple choice) at the end of each block. The lecture series comprises also *practical parts* (short lab visits), e.g. psychopathology rating, neuropsychology testing, imaging, diagnostics, cell culture work, behavioral studies etc.

Course ID:	A 13	**Credits:**	1.0	**Date:**	9-10 May 2011

Title of Course: Mouse histology & in situ expression analyses

Group Leader / Supervisor(s): Gregor Eichele, Helena Miletic

Place: MPI for Biophysical Chemistry, Department of Genes & Behavior, Am Fassberg 11, Tower 5, 2nd floor

Participants: min: 2 | max: 6

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

The histological analysis of gene and protein expression in tissue sections has become a widely used tool for studying biological processes *in vivo*. In the course we will stage mouse embryos, prepare histological sections of embryo and adult brain tissues from mice and analyze histology using standard staining procedures. If students are interested, the second part of the course will focus on expression analyses on sections using immunohistochemistry and *in situ* hybridization approaches.

Applied techniques will be: embryo preparation and staging, tissue sectioning, histological staining, chromogenic *in situ* hybridization and immunohistochemistry

Contact 1:	Helena Miletic	helena.miletic@mpibpc.mpg.de	Tel. 0551-201 2700
Contact 2:	Christine van den Bogaart	cbogaar@gwdg.de	Tel. 0551-201 2700

Comments:

Course ID:	A 17	**Credits:**	1.0	**Date:**	6-8 April 2011

Title of Course: Introduction to bioacoustic field methods: from recording to statistics

Group Leader / Supervisor(s): Julia Fischer, Rebecca Jürgens, Brandon Wheeler

Place: German Primate Center, Kellnerweg 4, seminar room B 2.12

Participants: min: 2 | max: 5

Duration: 2.5 d **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

This short methods course will provide a brief introduction into the basic steps of bioacoustic research.

We will begin with an introduction into the physics of sound, the mechanisms of sound production, and acoustic analyses. A mini-project will then be conducted with acoustic recordings in the field, selection of sounds for further analyses, and an overview of standard measures used in the analyses of animal and human sounds.

Research carried out within the German Primate Center will be presented to demonstrate the practical application of acoustic analyses including important statistical tools to answer relevant questions in the field of animal and human communication.

The course will last 2.5 days and will be held at the German Primate Center.

Contact 1:	Rebecca Jürgens	rjuergens@dpz.eu	Tel. 0551-3851 480
Contact 2:	Brandon Wheeler	bcwheeler43@gmail.com	Tel. 0551-3851 478

Comments:

Course ID: A 20 **Credits:** 1.0 **Date:** SS11, Wednesdays

Title of Course: Stochastic Processes in Physics and Biology

Group Leader / Supervisor(s): Theo Geisel, Jan Nagler, Marc Timme, Hinrich Kielblock

Place: Max Planck Institute for Dynamics and Self-Organization, Seminar Room, House 2, 4th floor

Participants: - | -

Duration: 2 SWS **Time on Day 1:** 10:15 h

Preparatory Meeting: No

Course description:

Stochastic Processes are used to describe a large variety of physical, biological and economic systems ranging from disease spreading, spiking of cortical neurons, temperature fluctuations of climate, and stock market price evolution.
In this seminar we will focus on recent themes in percolation theory, stochastic processes in biology and evolutionary dynamics.

Prerequisites for the course is a Bachelor's degree in physics or an equivalent degree. Each participant is highly encouraged to give one of the talks, but those who just want to listen and learn are also welcome.

Literature:

- L. E. Reichl, "A Modern Course in Statistical Physics", Wiley-VCH, 2009
- C. W. Gardiner, "Handbook of Stochastic Methods", Springer, 2003
- N. G. Van Kampen, "Stochastic Processes in Physics and Chemistry", Elsevier, 2007
- H. Risken, "The Fokker-Planck Equation: Methods of Solutions and Applications", Springer, 1996

Contact 1: Jan Nagler | jan@nld.ds.mpg.de | Tel. 0551-5176-418

Contact 2:

Comments: Credits: Participants wishing to receive credits need to attend the first meeting where topics for talks will be distributed. 2.0 credits for attendance and oral presentation.

GGNB Short Methods Courses: March – August 2011

GGNB
Göttingen Graduate School for Neurosciences and Molecular Biosciences

Course ID:	A 22	**Credits:**	1.0	**Date:**	SS 2011

Title of Course: Theoretical and Computational Neuroscience: Collective Dynamics Biological Neural Networks II

Group Leader / Supervisor(s): Theo Geisel, Marc Timme, Fred Wolf

Place: Max Planck Institute for Dynamics and Self-Organization, Seminar Room, House 2, 4th floor

Participants: min: 5 | max: 15

Duration: 2 SWS **Time on Day 1:** 14:00 h

Preparatory Meeting: No

Course description:

This lecture course offers an introduction to advanced modeling strategies for biological neural networks. After a short introduction to the biophysics of single cells and an overview of their basic firing patterns, we explain fundamental properties of networks models of neurons, starting from simple uniform connectivity and progressing to spatially extended and to arbitrarily complex interaction networks. These network models explain and predict key dynamical aspects of neural circuits, including irregular activity of cortical dynamics, feature selectivity, self-organization of neural maps, and the coordination of precisely timed spikes across networks.

Contact 1:	Dr. Marc Timme	timme@nld.ds.mpg.de	Tel. 0551-5176 440
Contact 2:			

Comments: Course unit II: Summer Semester / Fri, 14:00-16:00 (weekly). We recommend starting in the winter semester (with course A 21), but a start in a summer term is possible as well.

Course ID:	A 24	**Credits:**	1.0	**Date:**	SS 2011

Title of Course: Introduction to molecular dynamic simulation

Group Leader / Supervisor(s): Helmut Grubmüller, Jan Henning Peters

Place: MPI for Biophysical Chemistry, Department Grubmüller

Participants: min: 2 | max: 20

Duration: 1 day **Time on Day 1:** tba

Preparatory Meeting: No

Course description:

Molecular Dynamics (MD) simulations are a method to calculate the atomistic dynamic of biomolecules. The movements of all atoms are calculated based on their respective interactions to all other atoms.

The goal of this practical course is to learn the basic handling of this method. Starting with the examination of thermodynamic properties of a simple gas system, the concepts of MD simulations are shown. Later on, the build-up and simulation of a complete protein system is performed. In that part, also various analytical methods for MD simulations are considered.

Contact 1:	Jan Henning Peters	jpeters@gwdg.de	Tel. 0551-201 2312
Contact 2:			

Comments: 1 day course in groups of 2-3 students. Dates will be individually fixed.

Course ID:	A 25	**Credits:**	1.0	**Date:**	SS 2011, Fridays

Title of Course: Current Topics in Biophysics – Lecture Series

Group Leader / Supervisor(s): Helmut Grubmüller, Christoph Schmidt

Place: Seminar Room – Department of Prof. Schmidt, Section F, 2nd floor, room F02.125, Neue Physik, Friedrich-Hund-Platz 1

Participants: min: 5 | max: -

Duration: SS 11 | **Time on Day 1:** 09:15 h

Preparatory Meeting: No

Course description:

Rotation course that offers a broad overview of the methods actively used in the program “Physics of Biological and Complex Systems (from experimental to theoretical, from spectroscopy to whole-cell manipulations, from microscopy and nanoscopy to the simulation of complex systems). This "methods in a nutshell" course provides a unique opportunity to get acquainted with several techniques, both theoretical and experimental, as taught by the experts.

Contact 1:	Antje Erdmann	imprs-pbcs@gwdg.de	Tel. 0551-201 2322
Contact 2:			

Comments: 2 SWS

Course ID: A 27 **Credits:** 1.5 **Date:** SS 11, Mondays

Title of Course: Computational Biophysics II

Group Leader / Supervisor(s): Helmut Grubmüller, Bert de Groot

Place: Physics Faculty HS3, A0.106; Physics Faculty – CIP Pool1, CO.110

Participants: min: 3 max: -

Duration: SS 2011 **Time on Day 1:** 16:00-18.00h

Preparatory Meeting: No

Course description:

Combined lecture and hands-on computer tutorial. Theory and computer simulations of biomolecular systems, particularly proteins. Basic knowledge in Physics preferred.

No cell could live without the highly specialized “nano maschines” – the proteins. Proteins enable virtually all tasks in our bodies, e.g. photosynthesis, motion, signal transmission and information processing, transport, sensor system, and detection. The perfection of proteins had already been highly developed two billion years ago and often surpasses the functions of organs. Computer simulations of the motion of any single atom in the proteins help us to understand how those nano marvels function. The course focuses on the basics of computational biophysics and deals with questions like “How can the particle dynamics of thousands of atoms be described precisely?” or “How does a sequence alignment algorithm function?”. Moreover, the lecture shows (by means of examples) how computers can be used in the modern biophysics, e.g. to simulate the dynamics of biological nano maschines or to calculate or refine a protein structure. The aim of the lecture is to develop a physical understanding of those “nano maschines” on an atomistic scale.

"Computational biophysics II"
Advanced topics in computational biophysics.
Contents: Enzymatic catalysis, chemical reactions in proteins, free energy calculations, thermodynamics, Poisson-Boltzmann calculations, Transition State Theory, Jarzynski equation, sequence and structure bioinformatics, protein structure prediction, hands-on computer simulation.

Contact 1: Dr. Bert de Groot | bgroot@gwdg.de | Tel. 0551 – 201 2308

Comments:

Course ID:	A 28	**Credits:**	1.0	**Date:**	4-6 April 2011

Title of Course: *In situ* hybridization of paraffin embedded tissue sections

Group Leader / Supervisor(s): Heidi Hahn, Frauke Nitzki

Place: Abteilung Humangenetik, Heinrich-Düker-Weg 12

Participants: min: 2 | max: 4

Duration: 3 days* **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Students will learn how to perform the mRNA expression analysis on sections of paraffin-embedded tissues. The hybridisation itself will take 3 days (the final reaction will be completed after additional 1 – 2 days).

Contact 1:	Dr. Frauke Nitzki	fnitzki@gwdg.de	Tel. 0551-39 14013
Contact 2:			

Comments: * 3 days (plus an additional 1-2 days to complete the final reaction)

Course ID:	A 32	**Credits:**	1.0	**Date:**	18-19 May 2011

Title of Course: Chemical synthesis and enzymatic ligation of RNA and DNA oligonucleotides

Group Leader / Supervisor(s): Claudia Höbartner

Place: MPI for Biophysical Chemistry, AG Nucleic Acid Chemistry, T2, SOG

Participants: min: 2 | max: 4

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

The course covers methods for the automated solid-phase synthesis of chemically modified oligonucleotides by phosphoramidite chemistry, purification of synthetic RNA and DNA by anion exchange and reversed-phase HPLC and by preparative denaturing PAGE, and strategies for the enzymatic ligation of RNA fragments by protein enzymes and deoxyribozymes.

Contact 1:	Dr. Claudia Höbartner	Claudia.hoebartner@mpibpc.mpg.de	Tel. 0551-201 1685
Contact 2:			

Comments:

GGNB Short Methods Courses: March – August 2011

Course ID:	A 33	**Credits:**	1.0	**Date:**	4-5 April 2011

Title of Course: Reconstitution of neuronal exocytosis

Group Leader / Supervisor(s): Reinhard Jahn, Geert van den Bogaart, Yongsoo Park

Place: MPI for Biophysical Chemistry, Department of Neurobiology, T6, 1st Floor

Participants: min: 2 | max: 6

Duration: 2 days **Time on Day 1:** 09:30 h

Preparatory Meeting: No

Course description:

SNARE proteins are essential for membrane fusion in eukaryotic cells, in processes as diverse as ER to Golgi trafficking and neurotransmitter release. We are interested in understanding the mechanisms underlying secretion from neurons. We attempt to do this using a minimalistic assay, in which SNARE proteins are incorporated into artificial lipid vesicles. The SNARE protein interactions and mixing of the lipid bilayers, which occur upon fusion, are monitored using fluorescence methods.

Contact 1:	Dr. Geert van den Bogaart	Geert-van-den.Bogaart@mpibpc.mpg.de	Tel. 0551-201 1670
Contact 2:	Dr. Yongsoo Park	yongsoo.park@mpibpc.mpg.de	

Comments:

GGNB Short Methods Courses: March – August 2011

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Course ID:	A 34	**Credits:**	1.0	**Date:**	April 2011

Title of Course: BiFC (bimolecular fluorescence complementation) in yeast

Group Leader / Supervisor(s): Hans Dieter Schmitt, Saskia Schröter

Place: MPI for Biophysical Chemistry, Department of Neurobiology, T6, 1st Floor

Participants: min: 2 | max: 2

Duration: 2 days   **Time on Day 1:** 09:00 h

Preparatory Meeting: Yes*

Course description:

Bimolecular fluorescence complementation (BiFC) is used to visualize protein-protein interactions *in vivo,* using protein tags on the putative interaction partners. For this, the two fragments of a “split up” fluorescent protein (in our case YFP) are introduced at N- or C-terminus of the proteins of interest. These fragments do not associate unless the proteins carrying the tag bind each other. Flourescence is only emitted from the reconstituted YFP, not from its fragments.
This BiFC technique allows visualization of transient interactions since the assembly of GFP from its fragments is very likely irreversible. However, this may cause artefacts, as BiFC actually represents a “YFP fragment assembly trap”. In fact, some BiFC combinations have negative effects on growth probably due to this phenomenon.
The model organism used in this course is baker’s yeast *S. cerevisiae*. In this organism, homologous recombination works with high fidelity, enabling the introduction of BiFC tags directly at the chromosomal gene site, thus keeping the cells as close as possible to wildtype behaviour. Also, crossing of haploid strains with one BiFC tag each allow for easy and effective combination of two BiFC-tagged proteins in new strains.

Our group studies the interaction between vesicle coats and tethering complexes at the ER in yeast. In the course we will tag coat protein genes (involving PCR and transformation of cells), evaluate produced BiFC signals, and examine some examples where the BiFC signal correlates with effect on growth and viability.

Recommended reading:
Zink S, Wenzel D, Wurm C. and Schmitt HD. (2009). A link between ER tethering and COP-I vesicle uncoating. **Dev. Cell** 17:403-416.

Contact 1:	Dr. Hans-Dieter Schmitt	hschmit@gwdg.de	Tel. 0551-201 1652
Contact 2:	Saskia Schröter	sschroe4@gwdg.de	Tel. 0551-201 1714

Comments: *Preparatory meeting: approx. one week before the course.

Course ID:	A 35	**Credits:**	1.0	**Date:**	16-18 Mar 2011

Title of Course: Co-immunoprecipitation as a technique to study protein-protein interactions

Group Leader / Supervisor(s): Reinhard Jahn, John Chua, Beyenech Binotti, Janina Boyken

Place: MPI for Biophysical Chemistry, Department of Neurobiology, T6, 1st Floor

Participants: min: 2 | max: 6

Duration: 3 days **Time on Day 1:** 09:00 h

Preparatory Meeting: Yes

Course description:

Physical interactions between biological molecules are pivotal to the workings of many biological processes. Identification of molecules binding to an individual protein not only sheds light on its function but also provides valuable information on the cellular process or pathways with which it is associated.

While many approaches are available to identify or verify protein-protein interactions, co-immunoprecipitation remains a valuable *in vitro* method for this purpose. Nevertheless, the technique should be carefully implemented in order that the results may be reliably interpreted.

Day 1: Cell lysis and co-immunoprecipitation

Day 2: Washing of co-immunoprecipiates, SDS-PAGE and Western blot

Day 3: Development of Western blot

Contact 1:	Dr. John Chua	jchua@gwdg.de	Tel. 0551-201 1663
Contact 2:			

Comments:

GGNB Short Methods Courses: March – August 2011

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Course ID:	A 36	**Credits:**	1.0	**Date:**	9-10 June 2011

Title of Course: Protein purification and characterization

Group Leader / Supervisor(s): Reinhard Jahn, Karin Kühnel

Place: MPI for Biophysical Chemistry, Department of Neurobiology, Kühnel Group, T6, 1st Floor

Participants: min: 2 | max:4

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

This course is meant for students with little or no experiences in protein purification. We will purify proteins from *E.coli* extracts using high affinity, ion exchange and size exclusion chromatography with an Äkta-FPLC system. The purity of proteins will be analyzed by SDS-PAGE. We will also cover basic techniques in handling proteins, for example methods for determining protein concentrations, the dialysis of proteins and how to concentrate proteins through ultrafiltration.

Contact 1:	Dr. Karin Kühnel	kkuehne@gwdg.de	Tel. 0551-201 1795
Contact 2:			

Comments:

Course ID:	A 37	**Credits:**	1.0	**Date:**	12-13 April.2011

Title of Course: PCR based mutagenesis strategies to evolve (photoswitchable) fluorescent proteins

Group Leader / Supervisor(s): Stefan Jakobs, Tim Grotjohann, Tanja Brakemann

Place: MPI for Biophysical Chemistry, Department of NanoBiophotonics, T2, 2nd floor

Participants: min: 2 | max: 4

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

GFP-like fluorescent proteins are powerful tools to study protein dynamics in living cells. The actual properties of the fluorescent proteins may be dramatically altered by slight changes in their amino acid sequences. This practical course will cover several basic methods for targeted and random mutagenesis based on PCR. We will use the coding sequences of switchable fluorescent proteins as templates. The mutagenized proteins will be screened for variants exhibiting different properties.

Contact 1:	Prof. Stefan Jakobs	sjakobs@gwdg.de	Tel. 0551-201 2531
Contact 2:	Tim Grotjohann	tgrotjo@gwdg.de	Tel. 0551-201 2510

Comments:

Course ID: A 39 **Credits:** 0.5 **Date:** July 2011

Title of Course: Analysis of nucleocytoplasmic transport by flow cytometry

Group Leader / Supervisor(s): Ralph Kehlenbach

Place: Dept. of Biochemistry I, Humboldtallee 23, 37073 Göttingen

Participants: min: 2 max: 4

Duration: 1 d **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

This course will provide a brief introduction into the concepts of nucleocytoplasmic transport and its analysis by flow cytometry. We will express a transport factor in bacteria, purify it and test its activity in permeabilized cells. Nuclear import and export of fluorescent reporter proteins can be analyzed in parallel by flow cytometry. The principles of flow cytometry and its applications will be discussed.

Contact 1: Dr. Ralph Kehlenbach | rkehlen@gwdg.de | Tel. 0551-39 5950

Contact 2:

Comments:

Course ID: A 41 **Credits:** 1.0 **Date:** April 2011

Title of Course: Auditory and visual evoked potentials

Group Leader / Supervisor(s): Andrea Antal, Nicola Strenzke, Gerhard Hoch

Place: University Medical Center, Robert Koch Strasse 40. Dept. of Otolaryngology, level 3, room 687

Participants: min: 4 max: 10

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Summary:

Potentials arising from neuronal population responses to sensory stimuli such as light flashes and tone bursts offer a affordable and quantitative test of peripheral and central sensory processing. Analysis of sensory function has become an essential part of mouse phenotyping. In this 2 days practical course we will cover the biological basis, technical implementation, practical realization and data analysis of auditory and visual evoked potentials in the mouse.

Covered Topics and Methods:

Auditory Physiology: otoacoustic emissions, auditory evoked potentials: click and tone burst auditory brainstem responses, auditory steady state responses.

Visual Physiology: Scotopic and photopic electroretinogram (ERG), visual evoked cortical potentials (VEP), visual cognitive evoked potentials.

Contact 1:	Prof. Dr.rer.nat. Andrea Antal	aantal@gwdg.de	Tel. 0551-39 8461
Contact 2:	Dr. med. Nicola Strenzke	NStrenzke@med.uni-goettingen.de	Tel. 0551-39 9688

Comments:

Course ID:	A 42	**Credits:**	0.5	**Date:**	tab

Title of Course: Fundamental Principles of Sensory Processing

Group Leader / Supervisor(s): André Fiala, Martin Göpfert, Tobias Moser, Detlev Schild, Fred Wolf

Place: tba

Participants: min: 20 | max: 50

Duration: 1 day | **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Symposium and methods workshop with prominent speakers in sensory neuroscience.

How are sensory stimuli detected, encoded, and processed? The advanced theoretical training course 'Fundamental Principles in Sensory Processing' will review and discuss principles in the decoding of sensory information by nervous systems. The course, which mainly targets PhD students, includes a variety of lectures that will be presented by experts in the field. Various sensory modalities will be covered, with topics ranging from the transduction of stimuli by sensory receptor cells to higher-order stimulus processing. Presentations will invite lively interactions with the class, and there will be plenty of room for discussions.

Topics:
- Transduction of sensory stimuli: Signal transduction in somatic senses, audition, mechanosensation, chemical senses and vision
- Encoding of sensory information: Signal propagation and coding principles from primary to secondary neurons of the retina, the inner ear, electroreceptive organs and the olfactory system.
- Processing of sensory information by central networks: Higher-order processing of olfactory, auditory, somatic and visual senses

Further details will follow in a separate announcement.

Contact 1:	Prof. André Fiala	afiala@gwdg.de	Tel. 0551-39 3356
Contact 2:	Prof. Tobias Moser	tmoser@gwdg.de	Tel. 0551-39 8968

Comments:

Course ID: A 44 **Credits:** 1.0 **Date:** 9-10 May 2011

Title of Course: Subcellular localization of proteins by immunoelectron microscopy of cryosections

Group Leader / Supervisor(s): Klaus-Armin Nave, Wiebke Möbius

Place: MPI for Experimental Medicine, Dept. of Neurogenetics

Participants: min: 2 max: 3

Duration: 2 days **Time on Day 1:** 09:30 h

Preparatory Meeting: No

Course description:

Immunoelectron microscopy (IEM) is an important method to study the intracellular distribution of a protein of interest at high resolution. By IEM, the precise localization of a protein can be studied directly in its cellular environment, which is identified by morphological criteria. Here, we use chemically fixed tissue for ultrathin cryosectioning that was cryoprotected with 2.3 M sucrose and frozen in liquid nitrogen. Sections are labelled with antibodies and protein-A coupled to colloidal gold and viewed in the electron microscope.

Day 1: Introduction and cryosectioning

Day 2: Immunolabeling and electron microscopy

Contact 1: Dr. Wiebke Möbius | moebius@em.mpg.de | Tel. 0551-3899 736

Contact 2:

Comments:

Course ID:	A 45	**Credits:**	1.0	**Date:**	23-25 March 2011

Title of Course: Microdissection combined with RNA analysis in the brain

Group Leader / Supervisor(s): Klaus-Armin Nave, Moritz Rossner

Place: MPI for Experimental Medicine, Dept. of Neurogenetics, Hermann-Rein-Str. 3

Participants: min: 2 | max: 3

Duration: 3 days **Time on Day 1:** 11:00 h

Preparatory Meeting: No

Course description:

Day 1: Introduction, cryosectioning and staining of mouse brain on glass and membrane slides, microdissection, collection of samples

Day2: RNA preparation, Quality control using the Agilent Bioanalyzed, cDNA synthesis

Day3: qRT-PCR with cell-type specific primers to assess the purity of the samples

Contact 1:	Dr. Moritz Rossner	rossner@em.mpg.de	Tel. 0551-3899 781
Contact 2:			

Comments:

Course ID:	A 46	**Credits:**	1.0	**Date:**	18/20 Jul 2011, 19/21 Jul 2011

Title of Course: Theory and basics of fluorescence microscopy and imaging / Introduction to life science research applications FRET, FRAP, FLIM, caging – uncaging, GFP, Fluorescence microscopy of living cells

Group Leader / Supervisor(s): Olympus (Bodenschatz lab)

Place: Fluid Dynamics, Pattern Formation, and Nanobiocomplexity Research Group, headed by Prof. Bodenschatz, at the MPI for Dynamics and Self-Organisation, provisionally accommodated at the MPI for Biophysical Chemistry

Participants: min: 3 max: 10

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

This course will show how:

- to set up a microscope and camera for fluorescence observation with different illuminations settings and their correct alignment.
- to find the appropriate filter combination for a given fluorochrome and application.
- to describe the benefit of different possible filter combinations.
- to describe the benefit of different light sources.
- to create digital images of fluorescence specimen.
- to describe the special needs for microscope, camera and software according to main applications.

Furthermore the course gives an introduction to life science research applications:

- Principles of confocal microscopy; TIRF confocal microscopy
- FRET, FRAP, FLIM, caging – uncaging, GFP
- Fluorescence microscopy of living cells
- Types of applications (e.g. ion sensitive dyes, GFP)

Group 1: 18 and 20 Jul 2011
Group 2: 19 and 21 Jul 2011

Contact 1:	Dr. Helge Schmidt	helge.schmidt@olympus.de	Tel. 0160-7178732
Contact 2:	Barbara Kasemann	barbara.kasemann@ds.mpg.de	Tel. 0551-5176 310

Comments: The course will be offered to two groups of up to 5 participants per group.

Course ID: A 47 **Credits:** 1.0 **Date:** 9 & 13 May 2011

Title of Course: Real-time luminescence recording and imaging

Group Leader / Supervisor(s): Henrik Oster

Place: MPI for Biophysical Chemistry, Circadian Rhythms Group, Department of Genes & Behavior, Am Fassberg 11, Tower 5, 2nd floor

Participants: min: 2 max: 4

Duration: 2 days* **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

The transcriptional events that organize 24hr ("circadian") rhythms of physiology and behavior are controlled by a set of clock genes that are rhythmically expressed in many tissues of the mammalian body.

In the course we will prepare cultures from liver slices of PER2::LUC transgenic mice and of different reporter cell lines. We will monitor both circadian rhythmMay 2s and acutely induced expression of luciferase using PMT and luciferase imaging techniques.

On the second day luminescence traces and images will be quantified and compared between different setups. Applied techniques will include: tissue isolation, preparation of slices and culturing, cell culture synchronisation, transfection, luminescence recordings and imaging.

Contact 1: Dr. Henrik Oster | henrik.oster@mpibpc.mpg.de | Tel. 0551-201 2738

Contact 2:

Comments: * 2 separate dates with three days in between

Course ID:	A 53	**Credits:**	1.0	**Date:**	tba

Title of Course: Blue-native PAGE analysis of membrane protein complexes

Group Leader / Supervisor(s): Peter Rehling, Robert Reinhold

Place: Department of Biochemistry II, Humboldtallee 23

Participants: min: 2 | max: 3

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

By using a specialized native gel system, referred to as Blue-Native PAGE, membrane protein complexes of up to 1.5 MDa can be separated. Here we will focus on the analysis of mitochondrial membrane protein complexes such as the respiratory chain complexes. Upon solubilization the complexes can be separated and their higher oligomeric states, so called supercomplexes, can be visualized.

Contact 1:	Robert Reinhold	rreinho@gwdg.de	Tel. 0551-39 10132
Contact 2:			

Comments:

GGNB Short Methods Courses: March – August 2011

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Course ID:	A 56	**Credits:**	1.0	**Date:**	3-18 Mar 2011 or 4-11 Apr 2011

Title of Course: Introduction to basic histology techniques

Group Leader / Supervisor(s): Halyna R. Shcherbata

Place: Max-Planck Institute for Biophysical Chemistry, Tower 6, 2nd floor

Participants: min: 2 | max: 6

Duration: 2 d **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

Although histological methods are one of the oldest methods in biology, in a modern world they are still widely used to investigate disease etiology, progression, and manifestation in humans and in animal models and for the newest tissue engineering methods.

This laboratory course is designed to introduce graduate students to the fundamentals of histological analysis. Students will gain practical experience with fixation, paraffin embedding, microtome sectioning, H&E and immunofluorescent antibody staining and basics of histological analysis. We will use *Drosophila* as a model for muscular dystrophy, since we have previously shown that *Drosophila* mutants show age-dependents muscle degeneration. Various animal models have been widely used in the life sciences and medical research with hope to be eventually used to study disease prevention and treatment. Analysis in *Drosophila* helps us to better understand the origin of muscular dystrophy and mechanisms of muscle degeneration.

Students will analyze and compare at the fluorescent microscope level the physical appearance of the normal versus abnormal degenerated tissue and evaluate the levels of muscle degeneration.

Contact 1:	Dr. Halyna Shcherbata	hshcher@gwdg.de	Tel. 0551-201 1656
Contact 2:			

Comments:

Course ID:	A 60	**Credits:**	1.0	**Date:**	March/April 2011

Title of Course: Non-radioactive *in situ* hybridization

Group Leader / Supervisor(s): Christine Stadelmann-Nessler

Place: Klinikum, Dept. of Neuropathology, Robert-Koch-Str. 40

Participants: min: 2 | max: 3

Duration: 3 d

Time on Day 1: 09:00 h

Preparatory Meeting: No

Course description:

- Non-radioactive *in situ* hybridization: The students will perform non-radioactive *in situ*-hybridization for myelin proteins on brain sections of mice and rats.
- Immunohistochemistry for light microscopy. The students will perform immunohistochemistry for myelin proteins on brain and spinal cord tissue from mice with experimental autoimmune encephalomyelitis.

Contact 1:	Prof. Dr. C. Stadelmann-Nessler	cstadelmann@med.uni-goettingen.de	Tel. 0551-39 12610
Contact 2:			

Comments:

Course ID:	A 61	**Credits:**	1.0	**Date:**	March/April 2011

Title of Course: 3D structure determination of macromolecular complexes by single particle cryo-EM

Group Leader / Supervisor(s): Holger Stark, Florian Platzmann

Place: MPI for Biophysical Chemistry, 3D-Cryo Electron Microscopy lab

Participants: min: 2 | max: 2

Duration: 2 days **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

The course covers sample preparation procedures for studying large macromolecular complexes by electron cryo-microscopy. Macromolecules will be imaged in the electron microscope. A set of noisy two-dimensional projection images is obtained which can be used to compute the 3D reconstruction of the macromolecular complex making use of advanced computational image processing strategies.

Contact 1:	Prof. Holger Stark	holger.stark@mpibpc.mpg.de	Tel. 0551-201 1305
Contact 2:	Florian Platzmann	fplatzm@gwdg.de	Tel. 0551-201 1302

Comments:

GGNB Short Methods Courses: March – August 2011

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Course ID: A 62 **Credits:** 1.0 **Date:** 4-5 April 2011

Title of Course: Scanning Ion Conductance Microscopy, a versatile tool to study surfaces and surface properties.

Group Leader / Supervisor(s): Claudia Steinem, Andreas Janshoff, Ingo Mey, Christoph Saßen

Place: Institut für Organische und Biomolekulare Chemie, Tammannstr. 2

Participants: min: 2 max: 3

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

The basic principles of Scanning Ion Microscopy (SICM) will be taught. The participants will have the chance to operate the instrument and if they are interested, image samples they are bringing. At the end the participants will be able to operate a SICM by themselves.

Contact 1:	Ingo Mey	imey@gwdg.de	Tel. 0551-39 3095
Contact 2:	Christoph Saßen	csassen@gwdg.de	Tel. 0551-39 3208

Comments:

Course ID: A 63 **Credits:** 1.0 **Date:** 4-6 April 2011

Title of Course: Patch clamp

Group Leader / Supervisor(s): Walter Stühmer, Luis Pardo

Place: MPI for Experimental Medicine, Molecular Biology of Neuronal Signals, Labs C203/C207

Participants: min: 2 max: 6

Duration: 2.5 d **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

General introduction to the patch clamp technique with emphasis on whole cell recording of potassium voltage gated and ligand-gated P2X ion channels.

Contact 1:	Prof. Walter Stühmer	ws@em.mpg.de	Tel. 0551-3899 646
Contact 2:	Dr. Luis Pardo	pardo@em.mpg.de	Tel. 0551-3899 643

Comments:

Course ID:	A 64	**Credits:**	1.0	**Date:**	28-29 March 2011

Title of Course: Principles and methods of protein purification by chromatography

Group Leader / Supervisor(s): Kai Tittmann, Alexander Piontek, Stefan Schneider

Place: Ernst-Caspari-Haus / GZMB building, ground floor, Dept. of Bioanalytics

Participants: min: 4 | max: 6

Duration: 2 days | **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

The purification of recombinant proteins or proteins from native sources is a routine technique in modern biochemistry. In this course, participants will be trained in operating the most-commonly utilized protein chromatography system Äkta with an emphasis on hardware operation and maintenance, software programming and data evaluation. General strategies and principles of gel filtration, ion exchange and affinity chromatography will be experimentally demonstrated.

Contact 1:	Prof. Kai Tittmann	ktittma@gwdg.de	Tel. 0551-39 14430
Contact 2:	Dr. Danilo Meyer	dmeyer2@gwdg.de	Tel. 0551-39 14000

Comments:

Course ID:	A 65	**Credits:**	1.0	**Date:**	23-25 March 2011

Title of Course: Sequence analysis of proteins and their post-translational modifications by MALDI-ToF and electrospray ionization (ESI) mass spectrometry

Group Leader / Supervisor(s): Henning Urlaub, Ilian Atanassov, Romina Hofele, Samir Karaca, Saadia Qamar

Place: MPI for Biophysical Chemistry, Mass Spectrometry Group

Participants: min: 2 | max: 4

Duration: 3 d **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

Day 1: Theory: Mass spectrometry (MALDI vs. ESI) and Proteomics. Practical work: In-gel-digestion of phosphorylated and non-phosphorylated proteins.

Day 2: Extraction of peptides, Peptide mass fingerprint analysis in MALDI-ToF, Nano sequencing of peptides in ESI mass spectrometer.

Day 2 and 3: Nano sequencing of peptides in ESI mass spectrometer. Identification of phosphorylation sites in MALDI and ESI mass spectrometers.

The PhD students will not obtain any information what kind of protein they have to analyze and where the modification site is located. It will be their task to identify the protein and its modification site. SDS gels with already stained proteins will be provided.

Contact 1:	Dr. Henning Urlaub	henning.urlaub@mpibpc.mpg.de	Tel. 0551-201 1060
Contact 2:	Carla Schmidt	carla.schmidt@mpibpc.mpg.de	Tel. 0551-201 1500

Comments:

Course ID:	A 66	**Credits:**	1.0	**Date:**	9-10 March 2011

Title of Course: Isolation of recombinant proteins by affinity chromatography and binding studies

Group Leader / Supervisor(s): Lutz Walter

Place: Dept. of Primate Genetics, German Primate Center (DPZ), Kellnerweg 4

Participants: min: 1 | max: 2

Duration: 2 days | **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

We will prepare eukaryotic fusion proteins consisting of killer cell immunoglobulin-like receptors (KIR) of natural killer cells and the Fc portion of human IgG1. Fc-KIR fusion proteins will be collected from supernatant of transiently or stably transfected cells and isolated by affinity chromatography using protein A sepharose columns. After isolation Fc-KIR proteins are multimerised and fluorescently labeled and will be used to test specific interactions with MHC class I molecules by FAC analysis.

Contact 1:	Prof. Dr. Lutz Walter	lwalter@gwdg.de	Tel. 0551-3851 161
Contact 2:			

Comments:

GGNB Short Methods Courses: March – August 2011

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Course ID: A 67 **Credits:** 1.0 **Date:** April 2011

Title of Course: Introduction to Bioinformatics Methods

Group Leader / Supervisor(s): Lutz Walter, Markus Brameier

Place: Dept. of Primate Genetics, German Primate Center (DPZ), Kellnerweg 4

Participants: min: 2 max: 4

Duration: 2 days **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

The course is designed for graduate or undergraduate students. The first part (on day 1) will introduce into basic computational methods and databases in bioinformatics with a focus on genome analysis. This will be communicated by practical exercises, besides seminar discussions. In the second part (on day 2) the participants will be introduced into basic script programming (in Perl).

There is no need to bring your own computer. There will be two desktop computers available so that two students each are supposed to share one computer and work together.

Contact 1:	Dr. Markus Brameier	brameier@dpz.gwdg.de	Tel. 0551-3851 481
Contact 2:	Prof. Dr. Lutz Walter	lwalter@gwdg.de	Tel. 0551-3851 161

Comments:

GGNB
Göttingen Graduate School for Neurosciences and Molecular Biosciences

Course ID: A 68 **Credits:** 1.0 **Date:** May 2011

Title of Course: Mechanisms of RNA silencing

Group Leader / Supervisor(s): Lutz Walter, Jens Gruber

Place: Dept. of Primate Genetics, German Primate Center (DPZ), Kellnerweg 4

Participants: min: 3 max: 6

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

The course is designed for graduate students and addresses fundamental questions in the field of RNA interference (RNAi). RNA silencing will be discussed as (I) an endogenous mechanism for gene regulation via microRNAs and (II) as a tool for efficient functional gene characterization in reverse genetics approaches.

The practical part of the course will cover RNAi techniques such as siRNA transfection and gene knockdown detection as well as miRNA expression analysis via multi-reporter gene constructs.

After having completed the course the participants should be able to plan and perform simple RNAi experiments, including functional genetics and miRNA analysis

Contact 1: Dr. Jens Gruber | jgruber@dpz.eu | Tel. 0551-3851 481

Contact 2: Prof. Dr. Lutz Walter | lwalter@gwdg.de | Tel. 0551-3851 161

Comments:

Course ID: A 71 **Credits:** 1.0 **Date:** 31 Mar – 1 Apr 2011

Title of Course: Thermodynamic characterization of biomolecular interactions by isothermal titration calorimetry

Group Leader / Supervisor(s): Kai Tittmann, Danilo Meyer, Astrid Sitte

Place: Ernst-Caspari-Haus / GZMB building, ground floor, Dept. of Bioanalytics

Participants: min: 4 max: 6

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Isothermal titration calorimetry (ITC) has emerged as one of the most sensitive and powerful techniques for a rigorous thermodynamic characterization of biomolecular interactions such as protein-protein or protein-ligand interactions. Thus far, ITC is the only technique that determines directly the key thermodynamic parameters of a given interaction including the dissociation constant K_D, the Gibbs free energy of binding ΔG and its individual enthalpic (ΔH) and entropic contributions (ΔS), the stoichiometry n and the heat capacity Δc_p.

This course is aimed to provide the theoretical background of microcalorimetry as well as practical training for planning and performing ITC experiments. The binding interaction of trypsin and soybean trypsin inhibitor will be thermodynamically studied by the participants using the most advanced isothermal titration microcalorimeter iTC200 manufactured by Microcal.

Contact 1: Prof. Kai Tittmann | ktittma@gwdg.de | Tel. 0551-39 14430

Contact 2: Dr. Danilo Meyer | dmeyer2@gwdg.de | Tel. 0551-39 14000

Comments:

Course ID:	A 72	**Credits:**	1.0	**Date:**	11-12 April 2011

Title of Course: Surface Plasmon Resonance: basic principles and applications

Group Leader / Supervisor(s): Claudia Steinem, Andreas Janshoff, Daniela Behn

Place: Institut für Organische und Biomolekulare Chemie, Tammannstr. 2

Participants: min: 2 | max: 3

Duration: 2 days **Time on Day 1:** 7:00 h

Preparatory Meeting: No

Course description:

The principles of Surface Plasmon Resonance (SPR) will be presented. The optical response that is used in SPR based bio-sensors will be experimentally demonstrated with a few basic experiments. Afterwards, we will investigate the spreading of lipid vesicles and protein binding on planar surfaces.

Contact 1:	Prof. Claudia Steinem	csteine@gwdg.de	Tel. 0551-39 3294
Contact 2:	Daniela Behn	dbehn@gwdg.de	Tel: 0551-39 3209

Comments:

Course ID:	A 73	**Credits:**	1.0	**Date:**	13/20/27 May 2011

Title of Course: Introduction to Matlab in Systems Neuroscience

Group Leader / Supervisor(s): Dr. Alexander Gail, Beatrix Glaser

Place: Sensorimotor Group, Cognitive Neuroscience Lab, Hans-Adolf-Krebs Weg 7, German Primate Center

Participants: min: 3 | max: 6

Duration: 3 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

This course will provide a short introduction to the Matlab programming environment as a versatile tool in system neuroscience research. The course will be held on 3 days in consecutive weeks. You will be first introduced to the basic principles in Matlab programming, as introduced in the tutorial chapter of the course book. Course days will consist of a mixture of tutorial presentations and own practical exercises under supervision. During the exercises the new course material can be explored in small groups of two or three participants and discussed with the supervisor. Practical exercises will include analysis and graphical processing of test data. Exercises are chosen to address typical topics of system neuroscience, e.g. signal detection theory, neural encoding/curve fitting, correlation analysis, and spectral analysis.

Contact 1:	Dr. Alexander Gail	agail@gwdg.de	0551-3851 118
Contact 2:	Beatrix Glaser	bglaser@gwdg.de	0551-3851 118

Comments: Course book: Matlab for Neuroscientists, by Wallisch et al., Academic Press, 2009 (excerpts available as PDF for course participants)

GGNB Short Methods Courses: March – August 2011

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Course ID: A 75 **Credits:** 1.0 **Date:** May 2011

Title of Course: Chromatin Immunoprecipitation (CHiP)

Group Leader / Supervisor(s): Dr. Wolfgang Fischle, Dr. Stefan Winter, Nils Kost

Place: Laboratory of Chromatin Biochemistry, Max Planck Institute for Biophysical Chemistry, Tower 4, 1st floor

Participants: min: 2 max: 4

Duration: 2.5 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Chromatin immunoprecipitation is a widely used technique to identify the sides of specific histone modifications and/or the association of transcription factors with specific genomic regions. In its basic form (how it is performed in this course) the precise distribution of a histone modification or the position of a protein of interest in context of a known genomic locus can be monitored. The resolution of the method for histone modification ChIP is a single nucleosome (~200bp). The position of a given DNA binding protein can be determined with even higher accuracy.

In this course the phosphorylation status of H3S10 of the HDAC 1 gene promotor region in response to an environmental stimulus will be examined and compared to control cells that lack that stimulus. Goal of this course is the communication of basic cell culture techniques and of the single steps of a regular CHiP experiment. Typical pitfalls that corrupt CHiP experiments will be discussed. After this course each student should be capable of setting up her/his own CHiP experiment. In detail, the students will be shown how to treat eukaryotic cells prior to the preparation of nuclear extract. They will learn how to prepare the nuclear extract in order to perform the chromatin immunoprecipitation. The procedure of protein:DNA immunoprecipitation along with the recovery of the precipitated DNA will be taught. Polymerase Chain Reaction will be used to analyse the purified genomic DNA.

Contact 1: Dr. Stefan Winter | stefan.winter@mpibpc.mpg.de | Tel. 0551-201 1447

Contact 2: Nils Kost | nkost@gwdg.de | Tel. 0551-201 1342

Comments: none

Course ID: A 76 | **Credits:** 0.5 | **Date:** 11 May 2011

Title of Course: Traction Force Microscopy

Group Leader / Supervisor(s): Sarah Köster/ Sarah Schwarz

Place: Friedrich-Hund-Platz 1 (New Physics Building), Room E.00.110

Participants: min: 2 | max: 4

Duration: 1 day | **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

Traction force microscopy is a method to measure forces that cells exert on their (elastic) environment. Polyacrylamide gels with embedded fluorescent beads are prepared and coated with proteins or peptides which facilitate binding of cells via focal adhesions. Cells are placed on the gels and the cell shape is observed by microscopy. At the same time, the movement of the fluorescent beads is tracked. By relating the bead displacement and the elasticity of the gel force fields can be calculated using specialized soft ware.

Contact 1: Sarah Köster | Sarah.koester@phys.uni-goettingen.de | 0551-39 9429

Contact 2: Sarah Schwarz | Sarah.Henriques@phys.uni-goettingen.de | 0551-39 13748

Comments: suggested date (May 11) flexible; can be moved on request

Course ID:	A 77	**Credits:**	0.5	**Date:**	10 May 2011

Title of Course: PCR: self-made enzymes, helpful additives and insights into the reactions

Group Leader / Supervisor(s): Dirk Görlich/ Steffen Frey

Place: MPI for Biophysical Chemistry, Department of Cellular Logistics, T3, 3rd floor

Participants: min: 5 | max: 10

Duration: 1 day **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Polymerase chain reactions reactions (PCRs) require a thermostable DNA polymerase. In the first part of the course, we will discuss how helper enzymes and low molecular additives can greatly boost the efficiency of the reaction. Also, we will discuss of how to arrive at a PCR reaction with a very low error rate (there is more to say than "use a proof-reading enzyme"!). The second (practical) part provides the opportunity of preparing a high-end PCR enzyme yourself. The preparation utilizes some nice protein purification tricks.

Note: This course is scheduled as an intense, one-day-programme. It assumes that you are already familiar with transforming and culturing *Escherichia coli*. For those, who lack this experience, the course can also be offered as an extended version.

Contact 1:	Prof. Dirk Görlich	goerlich@mpibpc.mpg.de	Tel. 0551-201 2400
Contact 2:	Dr. Steffen Frey	sfrey@gwdg.de	Tel. 0551-201 2460

Comments:

Course ID: A 79 **Credits:** 0.5 **Date:** tba

Title of Course: Permeabilized cell assays for studying intracellular protein transport

Group Leader / Supervisor(s): Dirk Görlich, Chandini Kadian

Place: MPI for Biophysical Chemistry, Department of Cellular Logistics, T3, 3rd floor

Participants: min: 3 max: 4

Duration: 1 day **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Permeabilized cells are prepared by perforating the cholesterol-rich plasma membrane of cultured mammalian cells with low concentrations of digitonin. This releases soluble factors and allows entry of fluorescent probes into the cells. Transport of these fluorescent probes into cell nuclei can then easily be followed, either by direct fluorescent or by indirect immunofluorescence. We will teach how to label proteins with fluorescent dyes and how to perform permeabilized cell assays.

Note: This course is scheduled as an intense, one-day-program. It assumes that you are already familiar with culturing mammalian cells and seeding them onto coverslips. For those, who lack this experience, the course can also be offered as an extended version.

Contact 1:	Dirk Görlich	goerlich@mpibpc.mpg.de	Tel. 0551-201 2400
Contact 2:	Chandini Kadian	chandini.kadian@gmail.com	Tel. 0551-201 2412

Comments:

Course ID: A 80 **Credits:** 1.0* **Date:** 12-13 May 2011

Title of Course: Advanced bacterial protein expression and purification

Group Leader / Supervisor(s): Dirk Görlich, Steffen Frey

Place: MPI for Biophysical Chemistry, Department of Cellular Logistics, T3, 3rd floor

Participants: min: 5 max: 10

Duration: 1 day **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Recombinant protein expression in *Escherichia coli* is a key technology for biochemistry and structural biology. Expression of eukaryotic proteins, however, often results in low yield and poor solubility. We will discuss strategies, such as codon optimization, usage of special *E.coli* strains and growth conditions and the use of tags to amend such problem. The course will also provide a hands-on experience for the use of cleavable affinity tags.

Note: This course consists of two modules:
Module 1: Theory (0.5 day)
Module 2: Practical Part (1.5 days)

It assumes that you are already familiar with transforming and culturing *Escherichia coli*. For those, who lack this experience, the course can also be offered as an extended version.

Contact 1: Prof. Dirk Görlich | goerlich@mpibpc.mpg.de | Tel. 0551-201 2400

Contact 2: Dr. Steffen Frey | sfrey@gwdg.de | Tel. 0551-201 2460

Comments: *1.0 Credits for entire course (Modules 1 & 2 = 2 days)

Course ID: A 81 **Credits:** 1.0 **Date:** 11-12 Apr 2011

Title of Course: Introduction to transient kinetic methods

Group Leader / Supervisor(s): Marina Rodnina / Pohl Milon

Place: Max Planck Institute for Biophysical Chemistry, Department of Physical Biochemistry, Am Fassberg 11

Participants: min: 2 max: 4

Duration: 2 days **Time on Day 1:** 09:30 h

Preparatory Meeting: none

Course description:

Biological events are rapid and often take place within msec-sec time range. These processes can be investigated by means of transient kinetics, which is an essential method to study the mechanisms of enzymes, protein-ligand and protein-protein interactions. Detailed transient kinetics complements high resolution structural studies and together the two methods can give a molecular explanation of biological function. In this course we will explain the basic principles of transient kinetics, make experiments using rapid kinetics instrumentations, and discuss the data analysis, including numerical integration and global fit. Each full day will consist of 2 hours of seminars 4 hours of hands-on practical work and finish with a 1 hour evaluation/feedback tutorial.

The following experiments are planned:
Kinetics of enzyme-catalyzed reactions in msec range using quench-flow technique.
Protein-ligand binding using stipped-flow technique.

Contact 1:	Prof. Dr. Marina V. Rodnina	rodnina@mpibpc.mpg.de	0551-201 2901
Contact 2:	Dr. Pohl Milon	pohl.milon@mpibpc.mpg.de	0551-201 2934

Comments: Participants can bring their protein of interest.

Course ID:	A 82	**Credits:**	1.0	**Date:**	29-31 Mar 2011

Title of Course: Affinity purification methods for the isolation of large heterogeneous macromolecular assemblies

Group Leader / Supervisor(s): Reinhard Lührmann / Klaus Hartmuth

Place: MPI for Biophysical Chemistry, Seminar room, Tower III/1st floor

Participants: min: 2 | max: 4

Duration: 3 days **Time on Day 1:** 9 a.m.

Preparatory Meeting: No

Course description:

One of the most powerful methods in present-day biochemical purifications is affinity purification. The practical will introduce the students to procedures in which we employ a molecular tag on the pre-mRNA substrate to isolate spliceosomes.

We make use of a pre-mRNA tagged with three MS2 RNA aptamers. This is incubated with the MS2-MBP fusion protein, which interacts (i) with the pre-mRNA by binding strongly to the MS2 hairpins; and (ii) with an amylose affinity matrix through the MBP (maltose-binding protein) portion of the protein. The latter interaction is fully reversible, under mild conditions, by competition with maltose.

Experimentally, the introduction to our affinity purification procedure consists of (i) preparation of a tagged pre-mRNA, (ii) assembly of spliceosomes on the tagged pre-mRNA, (iii) size fractionation of the spliceosomes by gradient sedimentation, and finally (iv) affinity selection of the spliceosomes.

Contact 1:	Prof. Reinhard Lührmann	reinhard.luehrmann@mpi-bpc.mpg.de	0551 201 1407
Contact 2:	Dr. Klaus Hartmuth	khartmu@gwdg.de	0551 201 1650

Comments: Should 29-31 March 2011 should turn out to clash with other important dates of the participants, 8-20 April 2011 could be offered instead.

Course ID:	A 83	**Credits:**	1.0	**Date:**	7-9 April 2011

Title of Course: Drosophila Neurogenetics

Group Leader / Supervisor(s): Prof. André Fiala, Prof. Martin Göpfert

Place: Max-Planck-Institute for Experimental Medicine,
European Neuroscience-Institute

Participants: min: 3 | max: 6

Duration: 3 days | **Time on Day 1:** 9:00 h

Preparatory Meeting: No

Course description:

The fruit fly *Drosophila* represents a key model organism in modern neuroscience due to the genetic techniques by which neuronal circuits and genes can be manipulated. In this course a background in state-of-the-art genetic techniques used to investigate the function of neuronal circuits for behavior will be provided. Neuroanatomical, physiological, optogenetic and behavioral approaches will be exemplified both theoretically and in hands-on experiments. Topics include germ-line transformation, cell-type specific gene expression, optical calcium imaging, optogenetic manipulation of neuronal activity, genetic tools for neuronal silencing, behavioral and physiological studies.

Contact 1:	Prof. André Fiala	afiala@gwdg.de	0551 – 39 3356
Contact 2:	Prof. Martin Göpfert	mgoepfe@gwdg.de	0551 - 3899 437

Comments:

Course ID:	A 84	**Credits:**	1.0	**Date:**	tba

Title of Course: Chromatin-immunoprecipitation and epigenomic gene-profiling in the adult brain

Group Leader / Supervisor(s): Andre Fischer / Roman Stilling / Hope Agbemenyah / Sanaz Bahari Javan

Place: European Neuroscience Institute, 3rd floor

Participants: min: 3 | max: 6

Duration: 2 days

Time on Day 1: 8:30 h

Preparatory Meeting: Yes

Course description:

In addition the role of transcription factors it is now clear that gene-expression is also regulated via epigenetic mechanisms such as histone-modifications and DNA-methylation. In the last years new methods evolved to analyze epigentic gene-expression and those methods can now also be applied to the adult brain.

The aim of this course is to give an overview on Chromatin-immunoprecipitation (ChIP) using two different experimental appoaches. Participants will get hands on experience on how to perform ChIP analysis form the adult mouse brain followed by real time PCR analysis of gene promoter and coding regions of target genes.

Contact 1:	Andre Fischer	afische2@gwdg.de	0551 – 39 10378
Contact 2:			

Comments:

GGNB Short Methods Courses: March – August 2011

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Course ID:	A 87	**Credits:**	1.0	**Date:**	March 2011 (2nd half)

Title of Course: Neurosphere cultures from embryonic mouse brain

Group Leader / Supervisor(s): Group Leader / Supervisor(s): Anastassia Stoykova / Vanessa Paul

Place: Max-Planck-Institute for biophysical Chemistry, Department of Molecular Cell Biology / Turm 5 / 1st Floor, Am Fassberg 11, 37077 Göttingen

Participants: min: 2 | max: 4

Duration: 2 days **Time on Day 1:** 9:00 h

Preparatory Meeting: No

Course description:

The neurogenesis is a multistep process that includes proliferation of stem/progenitor cells, cell cycle exit, cell fate decisions in acquiring multiple neuronal versus glia cell fates, migration, and terminal differentiation. The specification of neural stem/progenitor cells is guided by extrinsic signals as well as by intrinsic mechanisms, including regulated expression of sets of transcription factors. Cell cultures provide a powerful tool to test hypothesis on *in vivo* properties of cells.

Two methods commonly used to culture stem/progenitor cells are neurospheres (NS) and monolayer cultures. In neurosphere cultures, mixed population of primary cortical cells are taken under non-proliferative condition and they generate free-floating spherical clusters. The regular passage of the NSs allows the enrichment of the dividing cells to achieve an almost homogeneous population. This allows for studying the effect of various factors on a defined population of progenitors with regard to their proliferation. To study differentiation properties of NS, the clusters are singularized and plated on polyD-lysine coated dishes for several days. Under non-proliferative conditions, progenitors differentiate into distinct cell types identified by immunohistochemistry with specific antibodies (cellular composition of a clonal NS cluster). By using nucleofection of NS cells with plasmid-DNA or siRNA one can study gene gain-of-function or gene-knock-down effects in-vitro on stem/progenitor proliferation and differentiation.

Day1: - Preparation of cortical cells from embryonic mouse brains for culturing under proliferative NS conditions

Day 2: - Set up of a differentiation assay of NSs from an advanced passage on pD-lysine coated dishes
- Observation of immunocytochemical stained NS with fluorescence microscope

Contact 1:	Vanessa Paul	vpaul@gwdg.de	0551-201 1469
Contact 2:			

Comments: The course will take place on two subsequent days between March 15 and March 30

Course ID:	A 89	**Credits:**	1.0	**Date:**	31 May – 1 Jun 2011

Title of Course: High resolution microscopy in synapses

Group Leader / Supervisor(s): Silvio Rizzoli / Dirk Kamin, Annette Denker

Place: STED Microscopy of Synaptic Function
European Neuroscience Institute, Grisebachstr. 5, Göttingen, 37077

Participants: min: 2 | max: 5

Duration: 2 days | **Time on Day 1:** 9:00 h

Preparatory Meeting: No

Course description:

Summary:
Conventional fluorescence microscopy is limited by diffraction to spots of ~200 nm in diameter. The real size of smaller objects cannot be distinguished. Also, objects found closer to each other than the diffraction limit cannot be distinguished. This limitation in imaging resolution can be overcome by several approaches:
One of the most successful is stimulated emission depletion (STED) microscopy, in which the excitation laser beam is overlapped with a second, doughnut-shaped beam, which quenches the excited molecules by stimulated depletion. As a consequence, fluorescence is generated selectively in the center of the excitation spot, where the quenching beam has its lowest intensity, close to zero. The resulting focal area is narrower than the diffraction limit, and therefore provides higher resolution.
A second approach is to take advantage of the exquisite resolution of electron microscopy. The fluorescently labeled preparation is fixed and illuminated in presence of di-amino-benzidine, which induces the formation of a dense precipitate in the immediate vicinity of the dye molecules (photo-oxidation). The precipitate can be easily observed in electron microscopy, and indicates the exact position and morphology of the fluorescent objects.
In the course days we will cover the theoretical basis of both techniques. Experiments involving synaptic vesicle function in both cultured cells and neuromuscular junctions will be performed for the two techniques.
Covered Topics and Methods:
Technical: fluorescence microscopy, resolution limitations, STED microscopy, basic electron microscopy, oxidation imaging.
Biological: pre-synaptic function, synaptic vesicle recycling, neuromuscular physiology.

Contact 1:	Silvio Rizzoli	srizzol@gwdg.de	0551-39 3630
Contact 2:			

Comments: The main techniques presented in the course can be learned in less than ~10 laboratories in Germany.

Course ID:	A 91	**Credits:**	0.5	**Date:**	tba

Title of Course: Activity measurements of respiratory chain enzymes

Group Leader / Supervisor(s): Peter Rehling, Milena Vukotic

Place: Biochemistry II, Humboldtallee 23

Participants: min: 2 | max: 2

Duration: 1 day **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

Enzyme activity can be analyzed spectrophotometrically and polarographically. Here we will focus on the analysis of respiratory chain complexes in isolated mitochondria.

Contact 1:	Milena Vukotic	mdjukan@gwdg.de	Tel. 0551-39 5983
Contact 2:			

Comments:

GGNB Short Methods Courses: March – August 2011

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Course ID: A 92 | **Credits:** 0.5 | **Date:** tba

Title of Course: Subcellular fractionation

Group Leader / Supervisor(s): Peter Rehling, Markus Deckers

Place: Biochemistry II, Humboldtallee 23

Participants: min: 2 | max: 2

Duration: 1 day | **Time on Day 1:** 8:00 h

Preparatory Meeting: No

Course description:

In this course we will isolate functional organelles from cultured cells via subcellular fractionation.

Contact 1: Markus Deckers | mdecker@gwdg.de | Tel. 0551-39 5983

Contact 2:

Comments:

Course ID:	A 93	**Credits:**	1.5	**Date:**	18-20 May 2011

Title of Course: The application of RNA structure determination methodology to the analysis of RNA-protein interactions in RNP complexes

Group Leader / Supervisor(s): Reinhard Lührmann / Klaus Hartmuth

Place: MPI for Biophysical Chemistry, Seminar room, Tower III/1st floor

Participants: min: 2 | max: 4

Duration: 3 days **Time on Day 1:** 9 a.m.

Preparatory Meeting: No

Course description:

The course will provide an in depth presentation of current methods used in RNA structure determination. This will include a theoretical introduction to chemical RNA modification and hands-on introduction to the experimental procedures. These are: (i) handling of RNA; (ii) chemical modification of RNA using DMS and kethoxal; (iii) analysis of the modified RNA by primer extension.

In a second part, current procedures of RNA modification as applied to the analysis on RNA-protein interactions will be discussed. Experimentally, we will use hydroxyl radical footprinting and we will focus on the analysis of defined RNA-protein interactions from the field of spliceosome research.

Contact 1:	Prof. Reinhard Lührmann	reinhard.luehrmann@mpi-bpc.mpg.de	0551 201 1407
Contact 2:	Dr. Klaus Hartmuth	khartmu@gwdg.de	0551 201 1650

Comments: Should 18-20 March 2011 should turn out to clash with other important dates of the participants, 15-17 June 2011 could be offered instead.

GGNB Short Methods Courses: March – August 2011

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Course ID:	A 94	**Credits:**	1.0	**Date:**	2-4 March 2011

Title of Course: Introductory biostatistics with R

Group Leader / Supervisor(s): Katharina Hoff

Place: Ernst-Caspari-Haus / GZMB building, Justus-von-Liebig-Weg 11, CIP pool (basement)

Participants: min: 5 | max: 18

Duration: 2.5 d **Time on Day 1:** 9:00 h

Preparatory Meeting: No

Course description:

R is a freely available programming language for statistics and graphics. This course covers the application of R on biostatistic problems. The following topics will be discussed and applied:
- descriptive statistics
- graphics
- t-test
- wilconxon test
- chi square test
- correlation analysis
- regression analysis
- ANOVA
- parametric and nonparametric multiple comparisons

Contact 1:	Dr. Katharina Hoff	Katharina.hoff@gmail.com	-
Contact 2:			

Comments: Please contact me via e-mail: katharina.hoff@gmail.com

Course ID: A 96 **Credits:** 1.0 **Date:** 21-22 March 2011

Title of Course: Nerve cell culture and patch-clamp recordings from nerve cells

Group Leader / Supervisor(s): Dr. Jeong Seop Rhee

Place: Neurophysiology Group, MPI for Experimental Medicine, Hermann-Rein-Str. 3

Participants: min: 2 max: 6

Duration: 2 d **Time on Day 1:** 9:00 h

Preparatory Meeting: No

Course description:

Keywords describing the course contents / lecture & exercises / target group

To study synaptic transmission mechanisms, my lab takes advantage of the single cell autaptic neuron culture system. This model system is ideally suitable for understanding the most important parameters underlying synaptic communication in a quantitative fashion. It is unique, as all synapses originate from a single axon. Thus different synaptic release modes can be quantified.

Step 1. Preparing autaptic neuron cultures
The autaptic preparation is defined by a single neuron that resides on an island of astrocytes with limited size, called a microisland culture. First, course participants will learn how the micoisland astrocyte culture is made and developed. Second, course participants will learn how to grow single neurons on the astrocyte islands. The applicants will learn to dissociate neurons from target areas of the mouse brain and to culture them on the astrocyte feeder culture.

Step 2. Measuring evoked synaptic transmission in autaptic cultures
In autaptic neuron cultures, all synapses that contact the dendrite of the neuron are formed by a single axon of the same neuron. Thus, all synapses can be stimulated to release transmitter at once by brief somatic depolarization. To understand the evoked synaptic responses, my lab uses a basic application of the patch clamp technique. Course participants will learn the basics of the measurement and quantification of synaptic responses in autaptic neuron cultures.

This course is intended for students who want to explore projects concerned with synaptic function in neurons.

Contact 1: Dr. JeongSeop Rhee | rhee@em.mpg.de | 0551-3899 694

Contact 2:

Comments: Basic theoretical knowledge of nerve cell and synapse function and of patch clamp methodology is desirable.

Course ID: A 97 **Credits:** 0.5 **Date:** 5 May 2011

Title of Course: Image Processing with ImageJ and MATLAB / Octave

Group Leader / Supervisor(s): Tobias Lapp, Max Neudecker, Sven Boekhoff

Place: Max-Planck-Institute for Dynamics and Self-Organization, AM FASSBERG 11 !, 37077 Göttingen (room tba)

Participants: min: 4 max: 20

Duration: 1 day **Time on Day 1:** 9:00 h

Preparatory Meeting: No

Course description:

Image processing has an increasing field of applications in science and industry. We explain basic steps of image preprocessing: Reducing of noise, deconvolution to reduce blurring of images, filtering inhomogeneities of the illumination and adapting the contrast. In a second step we show how to identify and separate objects in the images. The course will be based on examples of the work of the course supervisors. We will have presentations of the concepts and show how they are implemented in ImageJ and MATLAB / Octave. In a hands-on session the participants will have the chance to work with the image processing programs. We ask the participants to bring their own examples of images that they want to analyze.

Contact 1: Tobias Lapp | tobias.lapp@ds.mpg.de | 0551 – 5176 515

Contact 2: Max Neudecker | max.neudecker@ds.mpg.de | 0551 – 5176 235

Comments: Participants are encouraged to bring some of their images with them to the course or send them before per email.

Course ID: A 98 **Credits:** 0.5 **Date:** 7-8 April 2011

Title of Course: Introduction to image processing in biology with ImageJ

Group Leader / Supervisor(s): Dr. Mišo Mitkovski

Place: MPI for Experimental Medicine, Hermann-Rein-Str. 3, 37077 Göttingen, Room A1

Participants: Min: 5 max: 10

Duration: 2 days **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

An ever-increasing amount of biological events can be quantified by means of microscopy. A well-designed experiment may yield spatiotemporal information with regard to events taking place at the cellular or molecular level. A proper evaluation thereof requires understanding of what an image is, how it is generated and what subsequent processing methods are available.

Therefore, the underlying motivation for the course is the quantification of biological events through analysis of images generated with a microscope. The freely available "ImageJ" (http://rsbweb.nih.gov/ij/) is one of the several open-source applications that will be introduced towards this goal.

In particular, the components of an image will be discussed, as well as frequently used image types within their appropriate context. Basic concepts such as "lookup tables", "image calibration" or the creation of multi-channel (overlay) images will be explained along with several standard situations that a microscope user is faced with on the road toward a publication.

More advanced topics will include the modification of ImageJ installs to suit the respective need. Moreover, examples of basic image arithmetic and further image processing related to image stacks (i.e. time series), 3D reconstruction and automated image processing will be discussed.

Students attending the course may suggest topics they wish to have covered.

Contact 1:	Mišo Mitkovski	mitkovski@em.mpg.de	0551-3899 620
Contact 2:	GGNB Office	ggnb@gwdg.de	0551-39 14004

Comments: The date for the course can be changed. It is preferable if students have their own laptops. Alternatively, a computer lab will be necessary. Course will last 4 hrs per day.

Course ID:	A 100	**Credits:**	1.0	**Date:**	4/5/7/8 April 2011

Title of Course: Basic statistics for graduate students in the life sciences

Group Leader / Supervisor(s): Prof. Tim Friede / Dr. Frank Konietschke / Lange, Katharina

Place: Department of Medical Statistics, Humboldtallee 32, Computer Room (CIP)

Participants: min: 5 | max: 20

Duration: 4 d à 3 h **Time on Day 1:** 14:00 h

Preparatory Meeting: No

Course description:

This course is an introduction to the fundamental statistical concepts used in design and analysis of experiments in the life sciences. The course covers the following topics:

- *A primer in data management*
  - *How to set up a suitable spreadsheet for my experiment?*
  - *Being aware of data quality: How to conduct effective quality checks?*
  - *How to import data to R?*

- *Basic statistics for the design and analysis of experiments*
  - *Descriptive statistics and data visualization*
  - *Fundamental concepts of statistical inference: hypothesis testing and confidence intervals*
  - *Comparing two groups (considering various types of endpoints)*
  - *Basic designs*
    - *one-way factorial designs*
    - *two-way factorial designs*
    - *split-plot designs*
    - *cross-over designs*
  - *Sample size calculation: How many subjects or replications do I need?*

- *Interpretation of results*

- *The course will include applications in the statistical software package R (www.r-project.org).*

Contact 1:	Prof. Tim Friede	Tim.Friede@med.uni-goettingen.de	Phone: 0551-39 4991
Contact 2:	Dr. Frank Konietschke	fkoniet@gwdg.de	Phone: 0551-39 4989

Comments: Basic knowledge of programming in R is an advantage. Lecture and exercises on four afternoons from 14:00 – 17:15 h.

Course ID:	A 102	**Credits:**	1.0	**Date:**	6-7 June 2011

Title of Course: Crystallization of biological macromolecules

Group Leader / Supervisor(s): Vlad Pena, Jana Schmitzova, Ulrich Steuerwald, Inessa De, Tales de Moura, Jürgen Wawrzinek

Place: Max Planck Institute for Biophysical Chemistry, X-Ray Crystallography group, tower 3, 37077 Göttingen

Participants: min: 2 | max: 5

Duration: 2 days | **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

X-ray crystallography is the most powerful tool for the structure determination of macromolecules at atomic resolution. This practical course will provide a comprehensive introduction to state-of-the-art methodology applied in the field of macromolecular crystallography.

One part of the course will cover methods of sample preparation and characterization required prior to crystallization. Topics: bioinformatics for target selection, baculoviral recombinant expression, thermal shift assays and limited proteolysis.

The second part is dedicated to crystallographic methods themselves. Topics: high-throughput screening, storage and imaging of the plates, automated and manual optimization, crystals manipulation and cryo-protection.

Contact 1:	Vlad Pena, PhD	vpena@gwdg.de	Tel. 0551-201 1046
Contact 2:			

Comments:

Course ID: A 103 **Credits:** 2.5 **Date:** 21-25 March 2011

Title of Course: X-ray crystallography

Group Leader / Supervisor(s): Ralf Ficner, Piotr Neumann

Place: Department of Molecular Structural Biology, Ernst-Caspari-Haus / GZMB building, Justus-von-Liebig-Weg 11, CIP Pool (basement)

Participants: min: 5 max: 20

Duration: 5 days **Time on Day 1:** 08:15 h

Preparatory Meeting: No

Course description:

- LINUX introduction
- X-ray diffraction data collection (strategies)
- Processing of X-ray diffraction data
- Solving crystallographic phase problem
- MR, SAD, MAD, MIRAS
- Refinement & model building
- Structure validation

Contact 1: Dr. Piotr Neumann | pneuman2@uni-goettingen.de | 0551-39 14071

Contact 2:

Comments: daily from 8:15 – 17 h

GGNB Short Methods Courses: March – August 2011

Course ID: A 105 **Credits:** 1.0 **Date:** 16-17 May 2010

Title of Course: Equilibrium studies of protein-ligand interactions using fluorescence techniques

Group Leader / Supervisor(s):
Group Leader: Prof. Wolfgang Wintermeyer
Supervisor(s): Sejeong Lee, Albena Draycheva

Place:
MPI for Biophysical Chemistry, Dept. of Physical Biochemistry
Tower 4, 2nd Floor, Room 201 (Seminar Room)

Participants: min: 2 max: 4

Duration: 2 days **Time on Day 1:** 09:30 h

Preparatory Meeting: No

Course description:

There is a number of techniques that can be used to study protein-protein or protein-ligand interactions. The use of fluorescence has advantages as, due to the high sensitivity of fluorescence, measurements can be performed at low concentration, allowing high-affinity complexes to be studied. Structural information can be gained by studying fluorescence quenching and fluorescence resonance energy transfer (FRET).

The course will introduce several kinds of fluorescence measurements (excitation and emission spectra, correction of fluorescence spectra, fluorescence polarization/anisotropy, fluorescence lifetimes, collisional quenching). FRET measurements will also be introduced and performed.

Methods for introducing fluorescence labels into selected positions in proteins or nucleic acids will be presented.

Contact 1:	Prof. Wolfgang Wintermeyer	wwinter2@gwdg.de	0551-201 2902
Contact 2:	Albena Draycheva	albena.draycheva@mpibpc.mpg.de	0551-201 2914

Comments: Participants can bring their protein containing a single cysteine residue for labeling. The protein should carry a His-tag.

GGNB Short Methods Courses: March – August 2011

Göttingen Graduate School for Neurosciences and Molecular Biosciences

Course ID: A 106 **Credits:** 2.0 **Date:** 14-18 Mar 2011

Title of Course: Advanced macromolecular crystal structure determination

Group Leader / Supervisor(s): Tim Grüne

Place: Hodgkin seminar room (MN26, Tammannstr. 4)

Participants: min: 5 max: 30

Duration: 5 days **Time on Day 1:** 9:00 h

Preparatory Meeting: No

Course description:

Content of Course:
Data collection and integration, phasing, model refinement in X-ray crystallography: detailed insight in order to get the best out of crystals.

Recommended literature:
Rupp, Bernhard (2009) Biomolecular Crystallography: Principles, Practice and Application to Structural Biology. Garland Science, Taylor & Francis group, ISBN 978-0-8153-4081-2

Practicals:
5 days per student; practicals are offered in the following weeks:
Group A: Mar 28th – Apr 1st
Group B: Apr 4th – Apr 8th
Group C: Apr 11th – Apr 15th

Practicals take place 1pm – 5pm every day during the week. We can accommodate a maximum of 10 people in groups of two per week for the practicals.

Contact 1:	Dr. Tim Grüne	tg@shelx.uni-ac.gwdg.de	Tel. 0551-39 22149
Contact 2:			

Comments: **Participants must have attended the introductory course A57 or equivalent and ideally have already gathered some experience in X-ray crystallography!**

Course ID:	A 107	**Credits:**	1.0	**Date:**	April/May 2011

Title of Course: Tissue processing and immunohistochemistry on tissue sections of genetically engineered mouse models

Group Leader / Supervisor(s): Felix H. Brembeck, Nadine Thiede

Place: UMG, University Hospital, Research Laboratory "Tumor Biology and Signal Transduction", Dep. Hematology/Oncology, Room 1D4 681

Participants: min: 2 | max: 6

Duration: 2 days | **Time on Day 1:** 10:00 h

Preparatory Meeting: No

Course description:

Genetic mouse models are widely used to study gene function during development or in the initiation or progression of tumors. Our laboratory is analyzing different genetic tumor models to analyze early organ development and the development of intestinal and breast cancer.

Participants of this course will perform basic protocols, including hematoxylin-eosin stainings and immunohistochemistry. We will analyze and compare selected markers for differentiation and proliferation on tissue sections of our genetically engineered mouse models. The stainings will be evaluated for the morphology, the presence of (pre-)malignant transformations and the expression pattern of the selected markers.

Contact 1:	Prof. Dr. Felix H. Brembeck	brembeck@med.uni-goettingen.de	Tel. 0551-39 10568
Contact 2:	Nadine Thiede	thiede@med.uni-goettingen.de	Tel. 0551-39 10568

Comments:

GGNB Short Methods Courses: March – August 2011

GGNB
Göttingen Graduate School for
Neurosciences and Molecular Biosciences

Course ID: A 108 **Credits:** 0.5 **Date:** 1 July 2011

Title of Course: Homologs and Paralogs – how they evolve and how to distinguish them

Group Leader / Supervisor(s): Gregor Bucher, Ernst Wimmer

Place: Dept. of Developmental Biology, Ernst-Caspari-Haus / GZMB building, Justus-von-Liebig-Weg 11

Participants: min: 3 max: 8

Duration: 1 day* **Time on Day 1:** 09:00 h

Preparatory Meeting: No

Course description:

The comparison of gene function across species requires that the respective true orthologs are compared. These can be identified by sequence analysis.

- In the introductory lecture I will introduce to the evolution of genes and sequences with focus on the different origin of orthologs and paralogs.
- In the practical in silico work you will determine orthologs and paralogs of a given gene by performing blast searches, alignments and the calculation of phylogenetic trees.
- Subsequently, you are invited to identify orthologs of your favorite gene.

Contact 1: Prof. Gregor Bucher | gbucher1@gwdg.de | Tel. 0551-39 5426

Contact 2:

Comments: 9:00-15:00
If you wish you may bring the protein sequence of your favorite gene

GGNB Short Methods Courses: March – August 2011

GGNB
Göttingen Graduate School for
Neurosciences and Molecular Biosciences

Course ID:	A 109	**Credits:**	2.0	**Date:**	14-18 Mar 2011

Title of Course: Matlab and Python programming introductory course.

Group Leader / Supervisor(s): David Hofmann, Matthias Mittner, Sven Jahnke

Place: MPI for Dynamics and Self-Organization, Bunsenstr. 10, 37073 Göttingen, Haus 2, Seminar Room 4th floor.

Participants: min: 5 | max: 20

Duration: 5 days **Time on Day 1:** 09:15 h

Preparatory Meeting: No

Course description:

This course will give a short introduction to basic programming concepts and techniques using Matlab and Python as script languages. The focus will be set on data analysis with Matlab. You will be taught how to use Matlab efficiently for visualizing and modeling data. We will analyze different types of data such as sounds, images and neural spike trains. Furthermore, you will learn how to use the Matlab compiler to produce stand-alone routines and other advanced techniques.

The course is divided in theoretical and practical sessions with the following schedule:
Start at 9am to 12am, lunch break until 2pm, end at 5pm. The theoretical sessions will take place Monday, Tuesday and Thursday morning.

Contact 1:	GGNB Office	ggnb@gwdg.de	0551-39 14002/3/4
Contact 2:	David Hofmann	david@nld.ds.mpg.de	0551-5176 529

Comments: If you have already some experience with Matlab or Python and you encountered some unsolved difficulties bring your problems to the course for discussion with the tutors.

Course ID:	A 110	**Credits:**	2.0	**Date:**	18-22 July 2011 or 25-29 July 2011

Title of Course: High Pressure Freeze Electron Microscopy on its way to Correlative Microscopy and 4D EM

Group Leader / Supervisor(s): Stefan Eimer / Jan Hegermann, Maike Kittelmann, Carolin Wiechmann

Place: European Neuroscience Institute (ENI), Grisebachstr. 5, 37077 Goettingen

Participants: min: 4 | max: 6

Duration: 5 days | **Time on Day 1:** 9:00 h

Preparatory Meeting: Yes

Course description:

This practical course covers the most recent advances in high pressure freeze (HPF) electron microscopy (EM), which allows to cryo-immobilize samples without the need for prior chemical fixation. Thus, highly dynamic and transient structures and processes can be captured by HPF EM. Therefore, HPF EM has revolutionized EM and facilitates correlative microscopy. The course will cover multiple HPF EM applications such as sample preparation, HPF, immuno-EM, 3D EM-tomography, serial-block face sectioning EM and quantitative EM data analysis. As a special feature of this course, a novel technique using channelrhodopsin2 (ChR2) will be presented, which allows the analysis of neuronal processes after stimulation over time at the EM level and represents the emerging field of 4D EM.

The workshop will be organized as a series of lectures and tutorials, which are accompanied by extensive practical parts. In addition, a one-day symposium will take place at the end of the workshop with leading international EM experts.

Contact 1:	Stefan Eimer	seimer@gwdg.de	Tel. 0551-39 12379
Contact 2:			

Comments: The course will be offered both to GGNB students and other PhD students. 6 slots have been reserved for GGNB students.

E 02 - GGNB Extended Methods Course 2011

BIOANALYTICS

Date: **30 May – 10 June 2011**

Participants: **8**
Preference in the course assignment will be given to students interested in the entire course (2 weeks). It is possible though to participate in sub-segments of the course, if the number of participants allows for it.

Week 1 (30 May – 3 June 2011)

Day 1-3 (30.05. – 01.06.) Dr. Henning Urlaub, MPI for Biophysical Chemistry
Topic: Quantitative analysis of proteins and protein complexes
Techniques: Advanced protein mass spectrometry

Lecture: 30.05., 9 – 10 h, MPI-bpc
Training: 30.05., 10:30 – 16 h, MPI-bpc
31.05., 9 – 16 h, MPI-bpc
01.06., 9 – 16 h, MPI-bpc

Day 4-5 (02.06. – 03.06.) Dr. Adam Lange, MPI for Biophysical Chemistry
Topic: Solid-state NMR as a modern tool in structural biology
Techniques: Solid-state NMR spectroscopy

Lecture: 02.06., 9 – 10 h, MPI-bpc
Training: 02.06., 10:30 – 16 h, MPI-bpc
03.06., 9 – 16 h, MPI-bpc

Week 2 (6 – 10 June 2011)

Day 1 (06.06.) Dr. Karin Kühnel, MPI for Biophysical Chemistry
Topic: Protein crystallography
Techniques: Robot-assisted protein crystallization, crystal mounting, data collection

Lecture: 06.06., 9 – 10 h, MPI-bpc
Training: 06.06., 10:30 – 16 h, MPI-bpc

Day 2-3 (07.06. – 08.06.) Tittmann group
Topic: Rapid reaction techniques and kinetic analysis of biochemical processes
Techniques: Single mixing and sequential mixing stopped-flow absorption spectroscopy using diode array and photomultiplier detection, chemical quenched-flow

Lecture: 07.06., 9 – 10 a.m., GZMB
Training: 07.06., 10 – 16 h, GZMB
08.06., 09 – 16 h, GZMB

Day 4-5 (09.06. – 10.06.) Tittmann group & PD Dr. Ralph Golbik, Halle University
Topic: Thermodynamics and kinetics of protein folding
Techniques: Fluorescence spectroscopy, circular dichroism spectroscopy, stopped-flow fluorescence

Lecture: 09.06., 9 – 10 a.m., GZMB
Training: 09.06., 10 – 16 h, GZMB
10.06., 09 – 16 h, GZMB

E 03 - GGNB Extended Methods Course 2011

ENI Electrophysiology Training (ENI-ELECTRAIN)

Date: 9-20 May 2011

Location: European Neuroscience Institute (ENI-G), Grisebachstr. 5, 37077 Göttingen

Participants: 8

(2 groups A/B of 4 participants each, groups switch topics after 1st week, participation for both weeks mandatory, topics will be assigned to participants during the course)

TOPIC 1: *In vitro* Electrophysiology of Expressed Ion Channels
in *Xenopus laevis* oocytes (STÜHMER + PARDO)
(4 participants)

TOPIC 2: *In vivo* Electrophysiology of Identified Neurons
in *Hirudo medicinalis* (HÖRNER + FERBER)
(4 participants)

TOPIC 3: Measurement of synaptic parameters in mouse hippocampal
organotypic slices (SCHLÜTER + NN)
(4 participants)

Week 1/2 (9-13 May 2011 and 16- 20 May 2011), ENI Lecture Hall, ENI Teaching Labs

Topic: Expression and electrophysiological characterization of different ion-channels in the *Xenopus* oocyte expression system

Techniques: cDNA expression techniques in *Xenopus* oocytes, Two-electrode voltage clamp configuration and measurements, Quantitative evaluation and statistical analysis of different ion channels/conductances

Lectures: see separate schedule from 9-11h, ENI Lecture Hall (open to all GGNB students)
Practical Training: Monday through Friday from 13-18h, ENI Teaching Labs
Presentation of results: Friday 9-12h, ENI Lecture Hall, Friday afternoon: Cleaning-up

Week 1/2 (9-13 May 2011 and 16- 20 May 2011), ENI Lecture Hall, ENI Teaching Labs

Topic: *In-vivo* electrophysiology of identified neurons in *Hirudo medicinalis*

Techniques: Single and double intracellular recording techniques, single cell fluorescent labeling and 3d-imaging, Characterization of spontaneous and stimulus-evoked electrical activity patterns in identified neurons, Analysis of synaptic connectivity and network properties, Pharmacological characterization of different electrical conductances

Week 1/2 (9-13 May 2011 and 16- 20 May 2011) ENI Lecture Hall, ENI Teaching Labs

Topic: Measurement of synaptic parameters in mouse hippocampal organotypic slices

Techniques: Miniature EPSC recording of CA1 pyramidal cells, evoked AMPA receptor and NMDA receptor mediated synaptic transmission of Schaffer collateral CA1 pyramidal cell synapses, lentiviral-mediated molecular manipulation of CA1 pyramidal cells

Lectures: Monday and Tuesday from 9-11h, ENI Lecture Hall (open to all GGNB students)
Practical Training: Monday through Thursday from 13-18h, ENI Teaching Labs
Presentation of results: Friday 9-12h, ENI Lecture Hall, Friday afternoon: Cleaning-up

SELECTED LITERATURE:

TOPIC 1: *In vitro* Electrophysiology of Expressed Ion Channels in *Xenopus laevis* oocytes

Stühmer, W. (1998) Electrophysiological recordings from *Xenopus* oocytes.
Methods in Enzymol. 293, 280-300.

TOPIC 2: *In vivo* Electrophysiology of Identified Neurons in *Hirudo medicinalis*

Carretta, M. (1988) The Retzius Cells in the Leech: A Review of their Properties and Synaptic Connections.
Comp. Biochem. Physiol. 91A, 3: 405-413

Gaudry,Q., Kristan, W.B. (2009) Behavioral choice by presynaptic inhibition of tactile sensory terminals.
Nature Neuroscience. 2009;12(11): 1450-57; doi:10.1038/nn.2400)

Nicholls, J.G., van Essen, D. (1974): The nervous system of the leech. *Sci. American, 230: 38-48*

Rose, T, Gras, H, Hörner, M (2006) Activity-dependent suppression of spontaneous spike generation in the Retzius neurons of the leech, *Hirudo medicinalis L.*
Invertebrate Neuroscience 6: 169-176 (DOI 10.1007/s10158-006-0030-2)

TOPIC 3: Measurement of synaptic parameters in mouse hippocampal organotypic slices

Stein, V., House, D.R.C., Bredt, D.S., Nicoll, R.A. (2003): Postsynaptic Density-95 Mimics and Occludes Hippocampal Long-Term Potentiation and Enhances Long-Term Depression.
J. Neuroscience, July 2, 2003 • 23(13):5503–5506 • 5503