

**1st FEBS Advanced Lecture Course on
Systems Biology:**
From Molecules & Modeling to Cells
Gosau, Austria, EU, March 12-18, 2005



Organizers

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Intelligent Bioinformatics Systems
Deutsches KrebsForschungsZentrum
Heidelberg

Karl Kuchler
Department of Medical Biochemistry
Max F. Perutz Laboratories
Campus Vienna Biocenter
Medical University Vienna

Hans V. Westerhoff (program chair)
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Mathematical Biochemistry, BioCentrum
Amsterdam, Free University Amsterdam and
University of Amsterdam





Teacher-Members of the Scientific Advisory Board

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[FEBS](#) [The Federation of the European Biochemical Societies]

[BMBF](#) [German Bundesministerium für Bildung
und Forschung]



[NWO-ALW](#) [Netherlands Organization for Scientific
Research, NL]

[DKFZ](#) [Deutsche Krebsforschungszentrum]

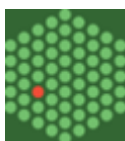


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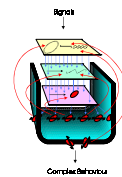
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FEBS Journal



Purac  PURAC

Amsterdam Systems Biology Institute



EML (European Media Laboratory)



GENome Research in AUstria

Merck A.G.

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Willkommen in Gosau, Welkom in Gosau, Welcome to Gosau!



In this snowy environment, we warmly welcome you to the first European Advanced Course on Systems Biology. Around the turn of the previous century, Biology was revolutionized: the sequence of complete genomes became available. Almost immediately many high-throughput, genome-wide analyses sprung up, which will soon enable us also to measure the expression levels of all genes at most levels of the cellular hierarchy. Perhaps never before, there has been such a sense of urgency. Never before did we seem to be so close to knowing how Life functions in terms of the properties of its molecules. Never before could we begin to think of the rational engineering of drugs targeting pathophysiology rather than individual molecules. Yet, when confronted with massive data

sets about the molecules of living cells, one tends to get confused rather than illuminated; the function of living cells cannot easily be read from what happens to the molecules. Much of functioning depends on many molecules simultaneously, which engage in complex interactions.

In parallel, biochemistry and biophysics focused more and more on the experimental assessment of molecular interactions. Together with mathematical biochemistry, these disciplines generated new paradigms for understanding how functional properties arise in interactions. These paradigms remained limited however, because not all components of the cellular systems were considered in the analyses, and because most components could not be accessed experimentally.

In 2005 much excitement lies in the synergy of the two above developments: functional genomics gleans from biochemistry, biophysics and mathematical biology how new function arises in nonlinear interactions, whereas the latter three may engage in functional genomics in order to measure all components that are important for the living cell. In fact all these paradigms are now merging into what one might call Integrative Systems Biology. Integrative Systems Biology is here defined as the science investigating how much of the functioning of living organisms comes about in the nonlinear interactions of all their molecules.

From this definition, from the large size of even the smallest genomes, and from the multitude and diversity of nonlinear interactions in Biology, it is readily understood that the challenge that Integrative Systems Biology poses is enormous. This young Science will require so much expertise in both experimental molecular biology and mathematics, in a highly interactive mode, that the way of doing Biology is being revolutionized. As Physics was in the 1950's, Biology is now becoming Big Science, *i.e.* Systems Biology. A new generation of scientists is needed. These scientists should be at ease with both experimental molecular biology and complex mathematics, and with almost anything that is in between. They should also be able to interact strongly and productively with each other, in large teams. This Course is meant to catalyze the formation of this new generation of scientists, from very young Ph D students, but also from established researchers. In this way the course should contribute to the development of science, also for the sake of humanity.

The need for training in Systems Biology was well recognized by our main sponsor, *i.e.* the Federation of European Biochemical Societies (**FEBS**). We appreciate the strong support through the FEBS Advanced Course Committee, in particular its previous chairman **Karel Wirtz**.

The need for training is also recognized by the national European organizations that fund modern biological and medical research. Indeed, the German Ministry for Education and Research (**BMBF**) and the Dutch Organization for Scientific Research, in particular its section on Earth and Life Sciences (**NWO-ALW**), have generously supported the course largely through student registration waivers.

The European Science Foundation (**ESF**), which aims to make the activities of the National European Science Funding Organizations synergize, has likewise given strong support. The ESF engages in a Forward Look study on Systems Biology, which will prepare its final report during the two days following this course, also in Gosau.

The 6th Framework Program of the European Union has funded a similar reconnaissance study on Systems Biology, through a Specific Support Action **EUSYSBIO**. EUSysBio also supports this course, as it will help define the Systems Biology field. A network of Excellence recently funded by the EU and partly directed at Systems Biology, *i.e.* **BioSim** coordinated by **Erik Mosekhilde**, has immediately assimilated this Course into its program of furthering excellent Systems Biology in Europe.

The number of new drugs that reach the market, and the number that thereafter survive, is diminishing. The cost of developing the drugs is becoming astronomical, largely because it is too difficult to choose between the large numbers of promising drug leads at an early stage. The ones that are plagued by 'side effects' and will not interact optimally with their target in the context of the living organism, are identified so late in the process that they absorb most of the budget. The critical issues here are again Systems Biology issues, and modern pharmaceutical companies are engaging strongly in this new field. Two of these, *i.e.*, **AstraZeneca** and **NovoNordisk**, enthusiastically support this meeting, both in terms of its lectures and **AstraZeneca** also in terms of the USB-sticks provided to all participants. Of course, various Software companies engage strongly in Systems Biology, not the least in interaction with these companies and the top Systems Biology Centers (see below). Of these, **Teranode** co-supports the USB sticks and their formatting.

It is unbelievable how ill-defined some of the food is that we enjoy on a daily basis. Both in terms of food safety, and in terms of improvements in their contribution to health, food production methodology is a field that may also be revolved by Systems Biology developments. After all, the production of food by living organisms and its use by human beings, abounds of interacting molecules in the context of living cells. **DSM** and **Purac** are supporting this Course.

The European Journal of Biochemistry (EJB) has been a pillar under Biochemistry in more than one way. First, it has always published scientific articles of high quality and significance. Second, it has always earned much of the money that is used to subsidize FEBS courses. At present, the journal is even more relevant to the emerging field of Systems Biology: (i) it is one of the earliest journals that highlighted the topic, such as through the direct link to the siliconcell model-base (www.siliconcell.net), and (ii) it has just undergone a facelift, becoming the **FEBS Journal** and orienting itself more towards quantitative cell biology and systems biology. To celebrate this, the journal offers us drinks at the Welcome Mixer.

Europe already has a number of Centers for Systems Biology. Of these, the **BioCentrum Amsterdam**, the **Deutsche Krebsforschungszentrum**, the **European Molecular Biology Laboratory**, and the **European Media Laboratory**, support this course financially. We expect that many Systems Biologist of the future will have been nurtured at these institutions. Likewise Japan has very important institutes, one of which has been world-leading for systems biology, including activities in California. We are pleased that **The Systems Biology Institute** is generously sponsoring this course.

Of course, the home institutions of the organizers have contributed rather importantly to the organization, *i.e.* the **BioCentrum Amsterdam**, the **DKFZ** and the **Max F. Perutz Laboratories of the Vienna Biocenter**. We also thank the **Institute of Molecular Pathology (IMP)** and the **Vienna Veterinary University** for providing poster walls, and the **Institute for Molecular Cell Biology, Amsterdam** for lending some of the additional equipment. Likewise the **Teachers** of the course (*i.e.* the **Lecturers** and the members of the **Scientific Advisory Board: Drs. Aebbershold, Alberghina, Alon, Boone, Cascante, Doyle, Eichelbaum, Goldbeter, Goryanin, Heinrich, Hohmann, Kell, Kholodenko, Kitano, Klingmüller, Klipp, Kummer, LeNovere, Noble, Reuss, Sauer, Schuster, Snoep, Stelling, Tomita, Van Driel, Wanner, and Wodak**) have spent quite some time in order to optimize their teaching at this course; their institutes have thereby also contributed.

A course is a matter of human beings, much more than of institutions. This course is possible thanks to the enthusiasm of the many people involved in the actual organization. **Jacky L. Snoep** has provided us with much of the artwork for the abstract book. We thank **Maria Bausback** for secretarial assistance during the course, **Walter Glaser** for helping with the adaptation of the web page, and **Hannes Davidek** of helping with graphic design. Of course the local organizing committee is quite important: we thank **Karen van Eunen**, **Frank Bruggeman**, **Richard Notebaart**, and all others for their contribution to the dynamics of the course. The director and staff of the **Sport und Erlebnis Hotel Gosau** are thanked for the professional way they arrange for infrastructure and food. And we thank **Emilia**, for her patience.

But of course, we should not forget the all-but-silent majority, *i.e.* the participants and their supporters (institutions and mentors), who contributed much effort and inspiration. Reading the abstracts we found that a great many innovative ideas were going to be contributed by the participants *in spe*. This course was the

first of its kind in Systems Biology. Because of the novelty of the field we had applied to FEBS for a course of 120 students. When the number of registrants exceeded 200, we were pleased because it demonstrated great interest and enthusiasm, but saddened because we had to deny many high quality applicants participation. Because quality and potential of most abstracts was high, we also had to select on the basis of more technical parameters, e.g. we limited the number of students coming from any same institution. We hope that the students we could not admit will come to a next course. Likewise, we have to admit that although our speakers/teachers are excellent Systems Biologists, we have not been able to attract all excellent Systems Biologist to the course: we had too few speaker slots.

What is next? An exciting course here in Gosau with lots of excellent teaching. The teaching program is special in that it hosts a number of unconventional teaching elements. The latter include the systematic discussion of **each** poster contribution by a number of senior scientists, black-board teaching, power-poster presentations, discussion sessions formulating key questions and subsequent sessions trying to address them. Equally importantly, new and more established Systems Biologists from various science directions will meet and discuss science intensively. We expect that Gosau will be the cradle of a network of excellent Systems Biologists who will know to find each other in the future for advice and collaboration. Thus, the interdisciplinary activities that are so important for Systems Biology, take off and make excellent new Science.

The organizers,

Anneke

and
her *troika* (i.e., Roland Eils , Karl Kuchler ,
and Hans V. Westerhoff)



Scientific Program - its principles

Symposia

The course has been organized in terms of **4 Symposia**, dedicated to areas within Systems Biology, *i.e.* 'Principles', Tools and Methodology', Unicellular Organisms and (Cells from) Multicellular Organisms. Each symposium has its dedicated day. On that day the symposium is kicked off with a number of plenary lectures in the morning. Discussions, Workshop talks by invited Principal Investigators, Short talks by invited poster presenters, and a Discussion follow. The posters and power posters corresponding to the symposium are have been grouped together, and will be presented in sequel on the three poster evenings (Sunday, Monday and Wednesday).

Tuesday morning has two extra lectures for symposium T and three extra for symposium U, before the cultural break.

Morning: Plenary Lectures - Discussion of the Issues

Each symposium is kicked off with four plenary lectures in the morning. The lecturer presents an oral presentation for 35 minutes, with a subsequent 10 minutes discussion period. This oral presentation should spend 5 minutes to introduce the field/topic, 15 minutes to teach a few important principles relevant to that topics, and then 15 minutes to report on recent work in which the principles are used in generating some excellent Systems Biology. It is important to realize that it is better to teach little well, than all not at all!

This is followed by a discussion session in which the most cogent Systems Biology questions related to the symposium topic are formulated.

Break for Lunch, Physical Activities, Tea

Lunch will be in the hotel restaurant. Course teachers are requested **not** to seat together. They should rather sit at their own table and be joined by students. Similarly, students are kindly requested **not** to sit together with other students from their own institute, but with Teachers, or with students and principal investigators of other institutes.

After lunch there is a break for physical activities, such as ski-ing, rock climbing, chess, or hang gliding. Be back for tea (coffee if you wish) at 16h00 to engage in the afternoon session that begins at 16h30.

Black-Board Teaching

On Sunday and on Monday, Blackboard teaching sessions will be held after the physical activity break and tea. These are optimized for interactive teaching. Key concepts for Systems Biology will be explained, in interactive mode, using blackboard and chalk, or equivalent. 4 Blackboard presentations will be held in parallel, such that each should be expected to host some 30 students. As a rule, each Blackboard teacher (-couple) presents his Blackboard presentation twice, *i.e.* on Sunday and then again on Monday. Each student is expected to be present at 2 out of 4 Black-board talks.

The following topics have been agreed to:

- Motifs and networks (Alon)
- Stability and flux mode analysis (Heinrich, & Schuster)
- Control analysis and silicon cells (Snoep & Westerhoff)
- Robustness (Stelling & Bruggeman)

Workshop (W) & Short Talks (S)

The topics of workshop presentations and short talks during the afternoon sessions, fall within the area of the main symposium of that particular day (or, in the case of M, of the day thereafter). These talks are usually delivered by principal investigators (W) and students (S), respectively. These speakers have been invited on the basis of their poster abstracts.

Late Afternoon Discussion

During the late-afternoon discussion, the questions raised during the morning discussion session will be addressed by the Lecturers and other Teachers of that symposium. This will be followed by a general discussion. The results of the discussion will be noted down and reported to FEBS, ESF and EUSYSBIO.

Poster Presentations, Poster Committees, Analyses, Discussions

The posters are up throughout the meeting; they should be mounted Sunday evening and removed Thursday evening.

Each poster will be presented for at least an hour by its prime author. Poster numbers $n-2$ will be presented/analyzed/discussed Sunday evening from 21h00 for at least an hour. Numbers $3n-1$ will be presented/analyzed/discussed Monday evening. Numbers $3n-3$ will be presented/analyzed/discussed Wednesday evening. Also the presenters of short talks are requested to present their poster, on the day of their short talk.

Authors presenting posters are asked to indicate on their poster additional times when they will be available at their poster for discussion.

Every student will get to speak the teachers in her/his symposium: each symposium has a corresponding Poster Committee, which consists of all lecturers at that symposium plus:

Symposium **Principles**: Alberghina (chair), Westerhoff plus P lecturers

Symposium **Tools**: Cascante (chair), Goryanin plus T lecturers

Symposium **Unicellular organisms**: Hohmann (chair), Kuchler plus U lecturers

Symposium **Mammalian systems**: Van Driel (chair), Kitano plus M lecturers.

During the first 45 minutes of each of the three poster sessions, this committee will inspect the one third of the posters belonging to their symposium that is being presented by their author that evening (*i.e.* up to ten posters). At the end of the poster session, *i.e.* from 22h30 – 23h00, *i.e.* in the 'poster round table discussion', the poster committee will discuss in a session with all poster presenters of their symposium all the posters they have seen that evening (*i.e.* this will be a non-plenary session with approximately 6 committee members and 10 poster presenters).

Power Poster Presentations (PoP's)

Principal investigators who have not been asked to give an oral presentation as Lecture or Workshop Talk, are requested to give a so-called PowerPoster Presentation (PoP). This is a 5 minutes' powerpoint presentation on one of five computers available in the poster halls. They will be asked to run this presentation repeatedly for any PoP viewer interested during the time slot allotted to the PoP presenter. PoP's occur in parallel to the poster presentation by students.

Participant Task List: Contribution/Timing of each Participant

Tasks are AC: Award Committee, B: Black board teaching, C: Chair, L: Lecture, O: Organizer, P: Poster, PC: Poster committee; PoP: Power Poster, S: Short talk plus poster, W: Workshop talk.

Full name	Date	Task	Symposium-Contrib.Number
Ronald Aardema	Sunday	Poster	P-P01
Niels Aarsaether	Sunday	PowerPoster	M-PoP01
Rüdi Äbersold	Monday, S, M, W	Lecture + Poster committee	T-L01 + T-PC
Charles Affourtit	Sunday	Poster	M-P01
Lilia Alberghina	Sunday + S, M, W, Th	Chair + Poster Committee Chair + Award Committee	P-C02 + P-PC + AC
Uri Alon	Wedn + S, M + SMW	Lecture + Blackboard+ Poster Committee	L05 + PT-B1 + U-PC
Ole Herman Ambur	Sunday	Poster	U-P01
Ivan Arisi	Monday	PowerPoster	M-PoP02
Herwig Bachmann	Monday	Poster	U-P02
Stephan Beirer	Monday	Poster	M-P02
Guillaume Beslon	Wednesday	Workshop Talk	U-W01
Martin Bezler	Wednesday	Poster	M-P03
Lars M. Blank	Wednesday	Poster	U-P03
Nils Blüthgen	Thursday	Short Talk + Poster	M-S01
Charlie Boone	Monday + S, M, W	Lecture + Poster committee	T-L04 + T-PC
Irina Borodina	Sunday	Poster	T-P01
Marc Breit	Sunday	Poster	M-P04
Marie Brown	Monday	Poster	P-P02
Frank J. Bruggeman	S, M + S, M + t	Short Talk + Black bpres+Orgr	P-S01, PT-B4
Marina Caldara	Sunday	Poster	U-P04
David Camacho	Wednesday	Poster	P-P03
Marta Cascante	Thurs+ S, M, W + Th	Ch+Post commCh+Aw commCh	M-C02 + M-PC + AC
Cyril Combe	Monday	Poster	T-P02
Holger Conzelmann	Monday	Poster	M-P05
Attila Csikasz-Nagy	Wednesday	Short Talk + Poster	U-S01
R. Keira Curtis	Sunday	Poster	P-P04
Holger Dach	Wednesday	Poster	T-P03
Sune Danø	Monday	Short Talk + Poster	T-S01
Robert P. Davey	Monday	Poster	U-P05
Gianni De Fabritiis	Monday	Poster	P-P05
Alberto de la Fuente	Wednesday	Poster	P-P06
Silvia De Monte	Wednesday	Short Talk + Poster	U-S02
Cathy Derow	Wednesday	Poster	M-P06
Helena Diaz-Cuervo	Sunday	Poster	P-P07
Claudia Donnet	Sunday	Poster	M-P07
Francesco d'Ovidio	Monday	Poster	P-P08
John Doyle	Sunday + S, M, W	Lecture + Poster committee	P-L02, P-PC
Oliver Ebenhöf	Wednesday	Poster	P-P09
Michael Ederer	Sunday	Poster	T-P04
Michel Eichelbaum	Thursday + S, M, W	Lecture + Poster committee	M-L01, M-PC

Thomas Eißing	Monday	Poster	M-P08
Martin Eigel	Wednesday	Poster	M-P09
Roland Eils	Monday + S, M	Lecture + Poster committee	T-L02 + T-PC
Martin Eisenacher	Monday	Poster	T-P05
Graham P. Feeney	Sunday	Poster	M-P010
Raquel Fernandez-Lloris	Monday	Poster	M-P011
Ana Sofia Figueiredo	Wednesday	Short Talk + Poster	U-S03
Emilie S. Fritsch	Wednesday	Poster	T-P06
Tobias Fuhrer	Wednesday	Poster	U-P06
Akira Funahashi	Sunday	Poster	T-P07
Laurent Gaubert	Wednesday	Poster	M-P12
Subhendu Ghosh	Saturday + Sunday	Music + PowerPoster	O-M + T-PoP01
Sergio Giannattasio	Sunday	Poster	U-P07
Adi Gilboa-Geffen	Sunday	Poster	M-P13
Patricio Godoy	Wednesday	PowerPoster	M-PoP03
Albert Goldbeter	Sunday	Lecture + Poster committee	P-L03 + P-PC
Didier Gonze	Monday	Poster	M-P14
Igor Goryanin	Monday + S, M, W,	Chair + Poster committee	T-C02 + T-PC
Niels Grabe	Monday	Poster	T-P08
Reingard Grabherr			
Ioan Grosu	Sunday	PowerPoster	P-PoP01
Vitaly V. Gursky	Sunday	Poster	P-P10
Benjamin A Hall	Wednesday	Poster	T-P09
Kristofer Hallén	Monday	Poster	P-P11
Thomas Handorf	Wednesday	Poster	P-P12
Franz Hartner	Sunday	Poster	T-P10
Mariko Hatakeyama	Thursday	Workshop Talk	M-W01
Feng He	Sunday	Poster	P-P13
Mariela Hebben-Serrano	Monday	Poster	U-P08
Reinhart Heinrich	Sunday	Lect + Blackb pres+Post comm	P-L01 + PT-B2 + P-PC
Julia Heßeler	Monday	Poster	P-P14
Noriko Hiroi	Wednesday	Poster	P-P15
Thomas Höfer	Thursday	Workshop Talk	M-W02
Stephan Hohmann	Tu-,Wedn+S,M,W+Th	Chair+PostCommCh+AwComm	U-C01 + U-PC + AC
Adaoha EC. Ihekwaba	Wednesday	Poster	M-P15
José M. Inácio	Wednesday	Poster	U-P09
Sergii Ivakhno	Monday	Poster	T-P11
Adrienne C. N. James	Monday	Short Talk + Poster	T-S02
Per Harald Jonson	Wednesday	Poster	T-P12
Paula Jouhten	Sunday	Poster	T-P13
Matthieu Jules	Monday	Poster	T-P14
Peter Juvan	Wednesday	Poster	T-P15
Visakan Kadiramanathan	Monday	PowerPoster	P-PoP02
Douglas B. Kell	Saturday	Opening Lecture	O-L01
Alexander Kern	Sunday	Poster	U-P10
Boris N. Kholodenko	Thursday + S, M, W	Lecture + Poster committee	M-L02 + M-PC
Hiraoki Kitano	Thursday + S, M, W	Chair + Poster committee	M-C01 + M-PC

Ursula Klingmüller	Thursday + S, M, W	Lecture + Poster committee	M-L04 + M-PC
Edda Klipp	Tuesday + S, M, W	Lecture + Poster committee	U-L01, U-PC
Tetsuya J. Kobayashi	Sunday	Poster	P-P16
Markus Kollmann	Sunday	Short Talk + Poster	P-S02
Anneke Koster	throughout	Organizer	O
Konstantin N. Kozlov	Monday	Short Talk + Poster	T-S03
M.T.A. Penia Kresnowati	Monday	Poster	P-P17
Albert Kriegner			
Karl Kuchler	Sun+S, M, W +throug	Chair+Poster Comm +Organizer	T-C01 + T-PC + O
Ursula Kummer	Tuesday + S, M, W	Lecture + Poster committee	T-L02 + T-PC
Lars Küpfer	Monday	Poster	U-P11
Ann Zahle Larsen	Wednesday	Poster	U-P12
Nicolas Le Novère	Thursday + S, M, W	Lecture + Poster committee	M-L03 + M-PC
Dirk Lebiedz	Wednesday	PowerPoster	P-PoP03
Kin Liao	Monday	PowerPoster	T-PoP02
Junli Liu	Sunday	PowerPoster	P-PoP04
Hong-Wu Ma	Wednesday	Poster	P-P18
Shaukat Mahmood	Sunday	Poster	M-P16
Asawin Meechai	Sunday	PowerPoster	U-PoP01
Thomas Millat	Sunday	Poster	P-P19
Liya A. Minasbekyan	Monday	PowerPoster	U-PoP02
Robert Modre-Osprian	Sunday	Poster	T-P16
Hisao Moriya	Monday	Poster	P-P20
Minca Mramor	Monday	Poster	T-P17
Dirk Müller	Sunday	Poster	U-P13
Douglas B. Murray	Wednesday	Short Talk + Poster	U-S04
Leo Neumann			
Ana R. Neves	Monday	Poster	U-P14
Cécile Nicolas	Wednesday	Poster	U-P15
Denis Noble	Thursday	Closing Lecture	O-L02
Richard A. Notebaart	Wednesday +through	Organizer + Poster	T-P18 + O
Jun Ohta	Wednesday	PowerPoster	T-PoP03
Rick Orij	Sunday	Poster	U-P16
Karen Page	Sunday	PowerPoster	M-PoP04
Balázs Papp	Monday	Short Talk + Poster	T-S04
Ainslie B. Parsons	Sunday	Poster	T-P19
Manish Patel	Monday	Poster	T-P20
Mikhail Paveliev	Monday	Poster	M-P17
Venkata G. Peddinti	Wednesday	Poster	P-P21
Esa Pitkänen	Sunday	Short Talk + Poster	P-S03
Jarne Postmus	Monday	Poster	U-P17
Bjørn Quistorff	Wednesday	PowerPoster	T-PoP06
Emma Redon	Wednesday	Poster	U-P18
Matthias Reuss	Tues + W + W, S, M	Lecture+Chair+Poster comm	U-L02 + U-C02 + U-PC
Riccarda Rischatsch	Sunday	Poster	U-P19
Isabel Rocha	Monday	Poster	U-P20
Juan-Carlos Rodriguez	Sunday	Poster	P-P22

Carlos Rodriguez-Caso	Wednesday	Poster	M-P18
Susana Ros	Sunday	Poster	M-P19
Julio Saez-Rodriguez	Monday	Poster	M-P20
Carlos Salazar	Monday	Poster	P-P23
Silvia D. Santos	Thursday	Short Talk + Poster	M-S02
Uwe Sauer	Wednesday	Lecture + Poster committee	U-L04 + U-PC
Thomas Sauter	Thursday	Short Talk + Poster	M-S03
Francesca Maria Scandurra	Wednesday	Poster	M-P21
Jana Schütze	Sunday	Poster	T-P22
Jörg Schaber	Wednesday	Poster	P-P24
H. Schmidt-Glenewinkel	Sunday	Poster	M-P22
Stefan Schuster	Sunday + S,M+S,M,W	Lecture+Blackb+Poster comm	P-L04 + PT-B2 + P-PC
Jacky L. Snoep	Tuesd+ S,M + S,M,W	Lecture+Blackb+Poster comm	T-L05 + PT-B3 + T-PC
Victor Sourjik	Wednesday	Workshop Talk	U-W02
Irena Spasic	Monday	Poster	T-P23
Christian Spieth	Sunday	Poster	P-P25
Dan Staines	Monday	PowerPoster	T-PoP4
Jörg Stelling	Tuesday+S,M+S,M,W	Lecture+Blackbpres+Postcomm	U-L03 + PT-B4 + U-PC
Ara H. Tamrazyan	Wednesday	Poster	U-P21
Sander Tans	Wednesday	PowerPoster	U-PoP3
Bas Teusink	Wednesday	Workshop Talk	U-W03
Rüdiger Thul	Wednesday	Poster	T-P24
Jens Timmer	Monday	PowerPoster	M-PoP5
Masaru Tomita	Wednesday + S,M,W	Lecture + Poster committee	U-L07 + U-PC
Nicolas Tourasse	Sunday	Poster	U-P22
Isil Tuzun	Monday	Poster	U-P23
Renata Usaite	Sunday	Poster	T-P25
Svetlana V. Ustyugova	Monday	Poster	M-P23
Yevhen Vainshtein	Monday	Poster	P-P26
Joost van den Brink	Wednesday	Poster	U-P24
Roel van Driel	Sun, Mon, Wed, Th	Poster Com Chair+Award Com	M-PC+ AC
Frank H.J. van Enkevort	Sunday	Poster	U-P25
Karen van Eunen	Wednesday+through	Poster + Organizer	P-P27 + O
Markku Varjosalo	Wednesday	Poster	M-P24
Vidya R. Velagapudi	Monday	Poster	U-P26
Dennis Vitkup	Sunday	Workshop Talk	P-W01
Todor Vujasinovic	Monday	PowerPoster	P-PoP5
Barry L. Wanner	Wednesday + S,M,W	Lecture + Poster committee	U-L06 + U-PC
Hans V. Westerhoff	Sa,Su,Th + S,M + thr	Chair + Blackboard + Organizer	P-C-1 + PT-B3 + O
Shoshana Wodak	Monday + S, M, W	Lecture + Poster committee	T-L03 + T-PC
Jian Wu	Wednesday	Poster	U-P27
He Yang	Wednesday	PowerPoster	M-PoP6
Sinisa Zampera	Sunday	Workshop Talk	P-W02
An-Ping Zeng	Monday	Workshop Talk	T-W02
Yu Zhang	Monday	Poster	T-P26
Hao Zhu	Sunday	Poster	M-P25
Philip Zimmermann	Wednesday	Poster	T-P27

Course Book - its Principles

Abstracts

All scientists present at the Course have been asked to formulate an abstract of their work or interests in Systems Biology, even those that are too new to the field to have much to report on Systems Biology itself. Most have complied. Accordingly the abstracts vary widely in content and quality. Constructive criticism will be formulated for all student abstracts, and it is in this constructive mode that all discussions should proceed; after all this is a Course, not just a conference. Please note that all abstracts, posters as well as oral presentations, must be considered "*privileged personal communications*". No data may be cited or used in any kind of verbal or written scientific correspondence with third parties without explicit permission of the presenting author.

Course ('Abstract') Book - Paper

The Course book on paper is meant to serve as an in-hand tool at the course. It contains:

- Most Course information
 - A list of when each participant has to present her/his work, or fulfill some other function
 - The program, described linearly in time, with all presentation represented by their authors and titles
 - Abstracts:
 - o first the abstracts of the oral presentations in the sequence of the (day-time) program
 - o then the abstracts of the poster presentations (including the ones also presented as short talks, and power posters), ordered per Symposium, then per type and then alphabetically.
 - List of addresses with presentation code
- Abstracts have been giving codes. The first letter refers to the symposium (**P**, **T**, **U**, **M**; for **P**inciples, **T**ools, **U**nicellular and **M**ulticellular, respectively). The second letter denotes to the type of presentation (L for lecture, W for workshop talk, S for short talk, P for poster, PoP for 'power poster'). Then a sequence number follows. For instance P-P22 refers to poster number 22 in the Symposium on Principles.
- a subject list referring to the abstracts in which the subject is mentioned
 - an authors list referring to anywhere where that participant is mentioned in this Course book
 - a list of addresses

Course ('Abstract') Book - Electronic

The Course book can also be found as a pdf file on the USB stick provided. The file should be considered non-citable 'preprints'. The program will also be published on the world wide web site (www.FEBSysbio.net).

Systems Biology Young Investigator Awards

The scientific merit of all abstracts (**posters** and **oral presentations**) submitted by **graduate students** and **postdoctoral researchers** as first authors will be evaluated by the teachers in the corresponding symposium. The best abstracts will be awarded a surprise prize, the "**Gosau Young Investigator Award**" during the Farewell Party. Also two short talk speakers will be awarded such a prize.

Web Site

The course has a website (www.FEBSsysbio.net), which will be *live* before, during and after the meeting. The website can be checked using the wireless network in many areas of the hotel, and using any of the host computers in the poster halls. The abstract book can also be found as a pdf file on the USB stick provided. The poster file should be considered a non-citable 'preprint'. The program will also be published on the world wide web site (www.FEBSsysbio.net).

Technical Local Information

We wish you a very pleasant stay at the venue of the 1st FEBS Advanced Lecture Course on Systems Biology in Gosau. We need to draw your attention to the following points:

Connections – You and the World

The meeting office has a laser printer, a copy machine, as well as phone (+43-6136-8811-390) and FAX (+43-6136-8811-352). Its mobile phone numbers are: +43 676 572 4348 and +43 676 572 4349. Any incoming FAX and phone call should clearly identify the addressee. You may not want to use the expensive phone in your hotel room, unless you have a calling card. When available, you can use our phone/FAX machine at regular post office-rates. At the venue, you can be reached, for urgent matters only, at the following e-mail address: hweste@bio.vu.nl, identifying the addressee by having: 'Urgent e-mail for xxx' on the subject line. For non-urgent matters use www.mail2web.com to inspect your own e-mail account, or use www.hotmail.com. At many locations in the hotel there is wireless internet. Computers, some of which are linked to the internet, are available next to the meeting office, as well as in the poster rooms.

Departure

Regular departure from the course is Friday morning after breakfast. At the message board near the Meeting Office there is a 'Departure sheet' which contains your name. Please be so kind to write the date and time of departure you request next to your name. The organizers will 'OK' your name, when they ensured transportation for you to Salzburg airport/train station. Please allow 90 minutes for the transportation from the hotel to the airport (and then of course more than 60 minutes for boarding the flight).

FEBS Evaluation Form

Most importantly, the FEBS EVALUATION FORM!

Please complete and return the lilac FEBS Evaluation Form you will find in your Meeting Pack to the meeting office no later than Thursday, March 17. Any and all criticisms (both positive and negative) are highly appreciated, because we are aware that nothing in this world can be perfect, but many things can be improved. It is imperative that we receive feedback from as many participants as possible (the best of course would be from all of you). Think about it, no return of evaluation forms - no more FEBS Courses on Systems Biology proteins in the future, and, lack of gratitude to FEBS for sponsoring so much of the present course.

FEBS-SysBio2005 Course Office

The meeting office is located in the basement of the Sport & Erlebnis Hotel**** (please follow the signs). If you need help in any way, please contact the meeting office ((+43-6136-8811-390; do not contact the hotel reception desk, please) or call the 24-hour FEBS-SysBio2005 hotline (+43 676 572 4348 and +43 676 572 4349). Daily office hours are in the morning from 7.30 – 8.30 am, at noon from 12.00 – 13.00 hours and in the evening from 7.30 – 9.00 pm.

Help

Any member of the local organizing staff, who wear **red** neck cords, will try to help you anytime with any problem you may encounter. Alternatively, turn to the Meeting Office, or call the hotline phone: +43 676 572 4348 and +43 676 572 4349

Message Board

Next to the Meeting Office there is a board for messages.

Meals, Beverages & Lunch Packages

Your registration fee includes all meals (breakfast, coffee and tea during the program's tea and coffee breaks, lunch, and dinner) and some non-alcoholic beverages at lunch, dinner and in the poster halls during the poster sessions. Other beverages consumed during lunch and dinner, are not included. For technical reasons, you cannot charge your beverages to your room: You must pay for your beverages at the table in cash in Euros. All beverages and drinks at the Welcome Party (thanks to FEBS Journal) and the Farewell Banquet are free of charge.

If you intend to hit the slopes or otherwise go out early for the afternoon break, you may wish to take a lunch package with you, rather than to eat lunch in the restaurant. You must then pick up a "Lunch Ticket" at the meeting office. Each day has a different color-coded Lunch Ticket with your name on it. You can pick up your Lunch Ticket at the meeting office for any day of the week during regular office hours at the latest, the day before consumption. **IMPORTANT**, should you for whatever reason not consume your lunch package, you cannot have regular lunch instead on the same day, because the kitchen prepares a limited number of meals, based on the number of meeting participants. Lunch packages themselves can be picked up in the HOTEL BAR around noon time in exchange for YOUR LUNCH TICKET for that day.

Payments

Any substantial payment to the course organization must have been made by giro/bank transfer before the course (cf. www.febssysbio.net). Reimbursements will follow the same route. The course currency is euros. We accept cash (EUR/US\$/UK£,JP¥) at current exchange rates (plus exchange cost) we collect from the www (no credit cards). A bank and a cash machine are located on the main road in the nearby village. Banks are open from 8 AM-12 AM and 2 AM to 5 AM in the afternoon (Mon-Fri).

Presentations

Oral presentations: All participants giving oral presentations are requested to be present in the lecture hall half an hour before their session starts (*i.e.* at 8.00 a.m. for talks in the morning and at 16h00 for talks in the afternoon; a member of the organizing committee will assist you). We prefer your files (*i.e.* Powerpoint) as a directory called "yournameSBcourse" [*e.g.* WesterhoffSBcourse] on a USB stick or CD-ROM. If your presentation links to any other files (*e.g.* movies), these should be in a single directory with the presentation with appropriate links. After copying the directory with your name to the hard disk of either of the two presentation computers in the lecture Hall (*i.e.* a Macintosh Powerbook and a PC Laptop), you should check whether your presentation and its links actually function. Alternatively, you may connect your own computer to the LCD projector for your talk, but only if you have checked this with the assistant, half an hour in advance.

You can use the computers in the poster halls and near the Meeting Office to check your presentation beforehand.

In case of a presentation that uses media other than LCD projection from computer, please inform the organizers well in advance: hweste@bio.vu.nl.

Posters: Course participants presenting Posters (including presenters of Short Talks) are requested to mount their posters in the dedicated poster areas on the poster board with their poster number (follow the signs) on Saturday evening. Your poster number is identical to the number you will find in the Course book next to the title of your abstract, in the Course book in the address list next to your name, and in the task list in the Course book (e.g. P-P04) (a Poster number always has a 'P' for 'Poster', or an 'S' for 'Short Talk' subsequent to the hyphen). Tape and/or pins must NOT be used to mount posters placed behind acrylic glass. If necessary, members of the organizing committee will help you mounting your poster on paper sheets first. For all other poster walls, pins are provided and local organizers will be pleased to assist you if necessary. Posters will stay on display until the evening of Thursday, March 17. The presenting authors needs to be present for at least one hour at the beginning of his poster session. Poster numbers n-2 will be presented / analyzed / discussed Sunday evening from 21h00 for at least an hour. Numbers 3n-1 will be presented / analyzed / discussed Monday evening. Numbers 3n-3 will be presented/analyzed/discussed Wednesday evening. Presenters of short talks are requested to present their poster on the day of their short talk, upstream the posters of their symposium. The dates of presentation can also be gleaned from the *Participant task list* in this course book (cf. above).

Power posters ('PopP's): PoP presenters are requested to load a powerpoint file with their presentation onto one of the PC's dedicated to PoP's, which are in the Poster Hall that also houses the PoP's (follow the signs). Numbers 3n-2 will be presented Sunday evening from 21h00 for at least an hour. Numbers 3n-1 will be presented Monday evening. Numbers 3n will be presented Wednesday evening. The dates of presentation can also be gleaned from the *Participant task list* in this Course book (cf. above).

Blackboard presentations: Blackboard Presenters should enquire at the Meeting Office. LCD projector will be available. Presenters are expected to connect their own personal computer. Flipovers will be available as well.

Computer presentations: Anyone wishing to demonstrate a computer program, can do so on an informal basis by making use of the PoP setup, in time slots not allocated to the PoP's.

Skiing and Outdoor Leasure

A daily bus shuttle to the "Hornspitzbahn" organized by FEBSSysBio2005 will leave the hotel 20 minutes after the last morning lecture. The return shuttle from the "Hornspitzbahn" to the Hotel will leave the "Hornspitzbahn" at 4.00 PM sharp. A schedule for the daily public ski bus, as well as a ski route map is included in your registration package. On Saturday and Sunday, you can go to the local ski school, located at the chair lift of the "Hornspitzbahn" for rental equipment such as alpine ski sets, snowboards and cross-country skis. If you show your FEBSSysBio2005 name badge, you will receive a discount on your rental gear. Moreover, you can sign up for skiing lessons, which usually last three to five days. We urge you to finish boot fitting and check-in as soon as possible after your registration, in order to avoid delays during the big rush on Monday.

Social Program

Salzburg. On Tuesday, we have scheduled for all course participants to visit Salzburg, the city of Mozart, with lots of surprises. Buses will leave the hotel at 13h30 and return to the Hotel around 23h30. There will time available for walks or shopping in romantic downtown Salzburg, but there will also be a common program. As you might expect, you should not forget to bring your ears, eyes, and taste buds Also be ready to discuss Systems Biology, on the bus, or in the

Depending on interest, we may organize the following excursions (Please enquire at the Meeting Office):

- Bad Ischl:* A trip to Bad Ischl, the favorite retreat of the one-time Austrian Emperor Franz Josef. Surrounded by a spectacular scenery you can enjoy the rich leisure offered of the magnificent little town Bad Ischl, just like Franz Josef did for more than forty years.
- Hallstadt:* A visit to this restored centre of a Salt and Copper mining town is a thrill.
- Ice Cave:* A visit to the “Koppenbrüller Ice Cave” leading you into the mighty Dachstein mountain range. Due to expected snowfall, this excursion may not be available.

Sport & Erlebnis Hotel Facilities

The hotel offers an indoor pool, two saunas, steam bath, gym, whirl pool, and solarium at no extra charge to the Course participants. Solarium and whirl pool take tokens that are available free of charge at the hotel reception desk, where further information is also available. Indoor tennis courts are available for a surcharge; please enquire at the hotel reception desk.

Scientific Program of SysBio2005

Saturday

March 12

Course Registration & Hotel Check-In

11:00 am - 6:00 pm

Welcome Reception

6:00 pm - 6:45 pm

Official Course Opening

6:45 pm - 6:55 pm

Hans Westerhoff and Karl Kuchler

***AstraZeneca* Opening Lecture**

Douglas Kell

7:00 pm – 8:00 pm

Metabolomics, machine learning and modelling in systems biology: towards
an understanding of the language of cells

**Welcome Dinner &
Subhendu Ghosh**

Musical performance
Patterns of Passion

8:30 pm - open end

Sunday

March 13

Breakfast

7:00 - 8:30 am

P rinciples of Systems Biology

Lectures

8:30 am - 12:30 pm

Chair: Hans Westerhoff

Co-chair: Lilia Alberghina

P-L1 **Reinhart Heinrich** 8:30 - 9:15

Dynamics and design of cellular reaction networks

P-L2 **John Doyle** 9:15 - 10:00

Organizational complexity

Coffee & Refreshment Break 10:00 - 10:20

P-L3 **Albert Goldbeter** 10:20 - 11:55

Computational approaches to cellular rhythms

P-L4 **Stefan Schuster** 11:05 - 11:50

Fundamentals and applications of metabolic pathway analysis

Break 11:50 - 12:00

Guided General Discussion:

Identifying issues; SB Principles 12:00 - 12:30 pm

Lunch & Afternoon Break 12:30 - 4:30 pm

Coffee and Tea Break 4:00 - 4:30 pm

Chalk/Blackboard teaching

4 in parallel

4:30 - 5:10 pm

PT-B1 Uri Alon Motifs and networks

PT-B2 Reinhart Heinrich/Stefan Schuster Stability and flux mode analysis

PT-B3 Jacky Snoep/Hans Westerhoff Control analysis and Silicon cells

PT-B4 Jörg Stelling/Frank Bruggeman Robustness, network identification and engineering

P rinciples of Systems Biology

Workshop & Short Talks

5:15 - 7:00 pm

Chair: Lilia Alberghina

Co-chair: Hans Westerhoff

P-W1 **Dennis Vitkup** 5:15 - 5:35

Expression dynamics of a cellular metabolic network

P-S1 **Frank Bruggeman** 5:35 - 5:50

Smart regulation of ammonium assimilation by *Escherichia coli*: modularity, robustness, and flux regulation

Coffee & Refreshment Break 5:50 - 6:10

P-W2 **Sinisa Zampera** 6:10 - 6:30

An adaptive system approach for the modelling of genetic regulatory networks

Glucose metabolism study in the yeast

P-S2 **Markus Kollmann** 6:30 - 6:45

Design principles of signal transduction pathways to attenuate noise

P-S3	Esa Pitkänen	6:45- 7:00
	On pathways and distances in metabolic networks	
	Resumed General Discussion:	Addressing the issues; SB principles 7:00 - 7:30
<i>Dinner</i>		7:30 - 9:00 pm
	Poster Session 1	9:00 - 11:00 pm
	Viewing posters	9:00 - 9:45
	Free poster wandering	9:45 – 10:30
	Round table poster discussion (presenters and teachers only)	10:30 – 11:00

Poster Presentations

- P-S01 Smart regulation of ammonium assimilation by *Escherichia coli*: modularity, robustness, and flux regulation. **Frank J. Bruggeman, Fred C. Boogerd and Hans V. Westerhoff**
- P-S02 Design Principles of Signal Transduction Pathways to attenuate Noise
Markus Kollmann, Kilian Bartholome and Jens Timmer
- P-S03 On pathways and distances in metabolic networks
Esa Pitkänen, Ari Rantanen, Juho Rousu and Esko Ukkonen
- P-P01 The use of accurate mass and time tags to measure yeast's glycolytic proteome
Ronald Aardema, Henk L. Dekker, Jaap Willem Back, Leo J. de Koning, Luitzen de Jong and Chris G. de Koster
- P-P04 Pathways to analysis of microarray data **R. Keira Curtis and Antonio Vidal-Puig**
- P-P07 A dynamic model of cAMP signal transduction in yeast **Dirk Müller, Helena Diaz-Cuervo, Luciano Aguilera-Vazquez, Klaus Mauch and Matthias Reuss**
- P-P10 Modelling of Drosophila segmentation gene expression with and without usage of attractors
Vitaly V. Gursky, Johannes Jaeger, Konstantin N. Kozlov, John Reinitz and Alexander M. Samsonov
- P-P13 Inferring gene regulatory relationships from time series microarray data based on the trend of expression changes. **Feng He and An-Ping Zeng**
- P-P16 A reductive approach to analyze stochasticity in intracellular networks.
Tetsuya J. Kobayashi and Kazuyuki Aihara
- P-P19 Modelling and simulation of dynamic signals in cells. **Thomas Millat and Olaf Wolkenhauer**
- P-P22 An *in silico* model for the optimization of threonine production in *Escherichia coli*.
Juan-Carlos Rodriguez, Jerome Maury, Christophe Chassagnole, Josep Centelles, Nic Lindley and Marta Cascante
- P-P25 Inferring regulatory networks from experimental data
Christian Spieth, Felix Streichert, Nora Speer and Andreas Zell
- T-P01 Genome-scale analysis of *Streptomyces coelicolor* A3(2) metabolism
Irina Borodina, Preben Krabben and Jens Nielsen
- T-P04 Reduced order modeling of global regulation - redox regulation in *Escherichia coli*
Michael Ederer, Thomas Sauter and Ernst Dieter Gilles
- T-P07 CellDesigner2.0: A process diagram editor for gene-regulatory and biochemical networks.
Akira Funahashi, Naoki Tanimura, Yukiko Matsuoka, Naritoshi Yoshinaga and Hiroaki Kitano
- T-P10 Speeding up the central metabolism in *Pichia pastoris*
Franz Hartner, Lars Blank, Alexander Kern, Uwe Sauer and Anton Glieder
- T-P13 NMR spectroscopy in systems biology: methods for metabolomics and fluxomics
Paula Jouhten, Minna Perälä, Eija Rintala Laura Ruohonen, Perttu Permi, Merja Penttilä and Hannu Maaheimo
- T-P16 An integrative framework for modeling signaling pathways **Robert Modre-Osprian, Marc Breit, Visvanathan Mahesh, Gernot Enzenberg and Bernhard Tilg**
- T-P19 Application of yeast genomic strategies to link biologically active compounds to their cellular targets
Ainslie B. Parsons, David Williams, Satoru Ishihara, Yoshi Ohya, Raymond Andersen, Timothy Hughes and Charles Boone
- T-P22 Glycolytic oscillations in spatially ordered interacting cells **Jana Schütze & Reinhart Heinrich**
- T-P25 Global transcriptional response of *Saccharomyces cerevisiae* to ammonium, alanine, or glutamine limitation **Renata Usaite, Birgitte Regenber and Jens Nielsen**

- U-P01 Neisserial DNA uptake sequences: biased distribution and influence on transformation.
Ole Herman Ambur, Stephan Frye, Tonje Davidsen, Hanne Tuven and Tone Tønrum
- U-P04 Experimental manipulation and mathematical modeling of arginine biosynthesis in *Escherichia coli*.
Marina Caldara, K. Verbrugghe, L. De Vuyst, M. Crabeel, G. Dupont, A. Goldbeter and R. Cunin
- U-P07 Retrograde response to mitochondrial dysfunction is separable from Tor1/2 regulation of retrograde gene expression. **Sergio Giannattasio**, Zhengchang Liu and Ronald Butow
- U-P10 Extending life by alternative respiration? **Alexander Kern**, Franz Hartner and Anton Glieder
- U-P13 A dynamic model of cAMP signal transduction in yeast. **Dirk Mueller**, Helena Díaz Cuervo, Luciano Aguilera-Vázquez, Klaus Mauch and Matthias Reuss
- U-P16 Stress induced by weak organic acids in *Saccharomyces cerevisiae*.
Rick Orij, Jarne Postmus, Gerco van Eikenhorst, Stanley Brul and Gertien Smits
- U-P19 Evolutionary conservation and divergence of fungal promoter sequences
Riccarda Rischatsch, Sylvia Voegeli and Peter Philippsen
- U-P22 Unusual group II introns in bacteria of the *Bacillus cereus* group.
Nicolas Tourasse, Fredrik Stabell, Lillian Reiter and Anne-Brit Kolstø
- U-P25 LacplantCyc: *in silico* reconstruction of the metabolic pathways of *Lactobacillus plantarum*.
Frank H.J. van Enckevort, Bas Teusink, Christof Francke and Roland J. Siezen

- M-P01 Control of the ATP/ADP ratio in pancreatic beta cells **Charles Affourtit** and Martin D. Brand
- M-P04 Sensitivity analysis with respect to initial values of the TNF α mediated NF-kappaB signalling pathway. **Marc Breit**, Gernot Enzenberg, Visvanthan Mahesh, Robert Modre-Osprian and Bernhard Tilg
- M-P07 Na,K-ATPase regulation via phospholemman phosphorylation
Claudia Donnet, Jia Li Guo, Amy Tucker and Kathleen Sweadner
- M-P10 Generating conceptual models in Zebrafish zinc homeostasis: The first steps towards and holistic view of zinc metabolism. **Graham Feeney**, Dongling Zheng, Peter Kille and Hogstrand Christer
- M-P13 Impaired gene expression in Sjogren's disease. **Adi Gilboa-Geffen** and Hermona Soreq
- M-P16 Towards a systems biology of signal transduction by insulin and insulin-like growth factors.
Shaukat Mahmood, Jane Palsgaard, Soetkin Versteyhe, Maja Jensen and Pierre De Meyts
- M-P19 Molecular dissection of the key LGS residues involved in the control of glycogen biosynthesis.
Susana Ros and Joan J. Guinovart
- M-P22 Quantitative modeling of EGFR-internalization as a mechanism of signaling specificity
Hannah Schmidt-Glenewinkel, Constantin Kappel and Ivayla Vacheva
- M-P25 Modeling emergent networks by dynamic reconstruction *in silico*. **Hao Zhu** and Pawan Dhar

Power Poster Presentations

- P-PoP1 New parameter estimation method with possible application in systems biology **Ioan Grosu**
- P-PoP4 Determination of *in vivo* non-steady-state fluxes and kinetic information using stable isotope labeling and metabolite pool size data: theory and application. **Junli Liu**, Alisdair R. Fernie and David F. Marshall
- T-PoP1 1/f Noise in Ion Channel: A Theory Based on Self-Organised Criticality
Jyotirmoy Banerjee, Mahendra K. Verma and **Subhendu Ghosh**
- T-PoP4 Using SRS to develop and populate an information layer for the EMI-CD modeling platform
Dan Staines, Daniel Flint and Thure Etzold
- U-PoP1 Modeling and analyses of *Mycobacterium tuberculosis* metabolism
Asawin Meechai, Supapon Cheevadhanalak and Sakarindr Bhumiratana
- M-PoP1 **Niels Aarsaether**
- M-PoP4 Module dynamics of the GnRH signal transduction network **Karen Page** and David Krakauer

Monday

March 14

Breakfast

7:00 - 8:30 am



Tools and methods (part 1)

Lectures

8:30 am - 12:30 pm

Chair: Karl Kuchler

Co-chair: Igor Goryanin

T-L1 **Rudi Aebersold** 8:30 - 9:15

Quantitative Proteomics: An essential component of systems biology

T-L2 **Roland Eils** 9:15 - 10:00

Modelling and simulation of large-scale signal transduction networks

Coffee & Refreshment Break 10:00 - 10:20

T-L3 **Shoshana Wodak** 10:20 - 11:05

Analysing networks of biochemical processes: Bioinformatics meets systems biology

T-L4 **Charlie Boone** 11:05 - 11:50

Global mapping of synthetic genetic interactions in yeast

Break 11:50 - 12:00

Guided General Discussion:

Identifying issues; Tools, Methods

12:00 - 12:30

Lunch & Afternoon Break 12:30 - 4:30 pm

Coffee and Tea Break 4:00 - 4:30 pm

Chalk/Blackboard teaching

4 in parallel (repeat)

4:30 - 5:10 pm

PT-B1 Uri Alon

Motifs and networks

PT-B2 Reinhart Heinrich/Stefan Schuster

Stability and flux mode analysis

PT-B3 Jacky Snoep/Hans Westerhoff

Control analysis and Silicon cells

PT-B4 Jörg Stelling/Frank Bruggeman

Robustness, network identification and engineering



Tools and methods

Workshop & Short talks

5:15 - 7:00 pm

Chair: Igor Goryanin

Co-chair: Karl Kuchler

T-W1 **An-Ping Zeng** 5:15 - 5:35

An integrated interaction network of *Escherichia coli* for studying genotype-phenotype relationship

T-S1 **Sune Danø** 5:35 - 5:50

Oscillatory mechanisms derived from phase and amplitude information

Coffee & Refreshment Break 5:50 - 6:15

T-S2 **Adrienne James** 6:15 - 6:30

Application of modelling and simulation to drug discovery: The ErbB system

T-S3 **Konstantin Kozlov** 6:30 - 6:45

Combined optimization technique for biological data fitting

T-S4	Balázs Papp	6:45- 7:00
	Systematic identification and characterisation of synthetic lethal interactions in the metabolic network of yeast	
	Resumed General Discussion:	Addressing the issues Tools & Methods 7:00 - 7:30
Dinner		7:30 - 9:00 pm
	Poster Session 2	9:00 - 11:00 pm
	Viewing posters	9:00 - 9:45
	Free poster wandering	9:45 – 10:30
	Round table poster discussion (presenters and teachers only)	10:30 – 11:00

Poster Presentations

T-S01	Oscillatory mechanisms derived from phase and amplitude information Sune Danø, Mads Madsen and Preben G. Sørensen
T-S02	Application of modelling and simulation to drug discovery: The ErbB System Bart Hendriks, Gareth Griffiths, Jack Beusmans, Adrienne James, Julie Cook, Jonathan Swinton and David De Graaf
T-S03	Combined optimization technique for biological data fitting Konstantin N. Kozlov, Alexander M. Samsonov and John Reinitz
T-S04	Systematic identification and characterisation of synthetic lethal interactions in the metabolic network of yeast. Balázs Papp, Richard Harrison, Daniela Delneri, Csaba Pál and Stephen Oliver
P-P02	Metabolic footprinting: its role in systems biology Marie Brown, Rick Dunn, Julia Handl and Douglas Kell
P-P05	Multiscale modelling of a cell Gianni De Fabritiis and Peter Coveney
P-P08	Metabolic quorum sensing: experiments with <i>S. cerevisiae</i> Francesco d'Ovidio, Silvia De Monte, Sune Danø and Preben Graae Sørensen
P-P11	Discovering compound mode of action with CutTree Kristofer Hallén, Johan Björkegren and Jesper Tegnér
P-P14	Secondary metabolites can create coexistence in the chemostat Julia Heßeler, Julia K. Schmidt, Udo Reichl and Dietrich Flockerzi
P-P17	Linlog Modeling Approach: Theoretical Platform for System Biology M.T.A. Penia Kresnowati, Wouter van Winden and Sef Heijnen
P-P20	Systems analysis of yeast glucose sensing system Hisao Moriya and Hiroaki Kitano
P-P23	Kinetic models of phosphorylation cycles: the role of protein-protein interactions Carlos Salazar and Thomas Höfer
P-P26	First steps towards a multi-dimensional iron regulatory network Yevhen Vainshtein, Martina Muckenthaler, Alvis Brazma and Matthias W. Hentze
T-P02	Relational learning of biological networks Cyril Combe, Florence d'Alché-Buc, Vincent Schachter and Stan Matwin
T-P05	Technical variance, quality control and scaling: necessary steps towards meta-analyses on large expression databases. Martin Eisenacher, Harald Funke, Thomas Vogl, Christoph Cichon, Kristina Riehemann, Clemens Sorg and Wolfgang Koepcke
T-P08	Simulation of epidermal homeostasis including barrier formation Niels Grabe and Karsten Neuber
T-P11	Software components for analysis of DNA microarray and quantitative proteomics data Sergii Ivakhno and Olexander Kornelyuk
T-P14	Autonomous oscillations in <i>Saccharomyces cerevisiae</i> during batch cultures on trehalose. Matthieu Jules, Jean-Marie Francois and Jean-Luc Parrou
T-P17	Data visualization for gene selection and modeling in cancer bioinformatics Minca Mramor, Gregor Leban and Blaž Zupan
T-P20	SClpath - an integrated environment for systems biology analysis and visualisation. Manish Patel
T-P23	Database Support for Yeast Metabolomics Data Management Irena Spasic, Warwick Dunn and Douglas Kell
T-P26	Identification of the C-terminal signal peptides for GPI modification and prediction of the

cleavage sites. **Yu Zhang**, Thomas Skoet Jensen, Ulrik de Lichtenberg and Soeren Brunak

- U-P02 Gene expression and adaptive responses of *in situ* fermentation
Herwig Bachmann, Michiel Kleerebezem and Johan E. van Hylckama Vlieg
- U-P05 Comparative metabolomics of *Saccharomyces* yeasts. **Robert P. Davey¹**, G Lacey¹,
DA MacKenzie, M Defernez, FA Mellon, K Huber, V Moulton and IN Robert
- U-P08 Unravelling new metabolic networks in LAB via the thioredoxin system
L. Mariela Hebben-Serrano, Eddy Smid and Willem M. de Vos
- U-P11 Systematic computational modelling reveals a key operating principle of TOR signalling in yeast
Lars Kuepfer, Matthias Peter, Jörg Stelling and Uwe Sauer
- U-P14 Natural sweetening of food products: engineering *Lactococcus lactis* for glucose production
Wietske A. Pool, **Ana R. Neves**, Jan Kok, Helena Santos and Oscar P. Kuipers
- U-P17 Adaptation of yeast glycolysis to temperature changes.
Jarne Postmus, Jildau Bouwman, Rick Orij, Stanley Brul and Gertien Smits
- U-P20 A Systems Biology approach for the optimization of recombinant protein production in *E. coli*
Eugénio Ferreira and **Isabel Rocha**
- U-P23 The effect of oxygen tension on yeast glycolysis
Isil Tuzun, Klaas Hellingwerf and M. J. Teixeira de Mattos
- U-P26 High-throughput screening of *Saccharomyces cerevisiae* knockout library: method development and
stoichiometric profiling. **Vidya R. Velagapudi**, Christoph Wittmann, Thomas Lengauer, Priti Talwar
and Elmar Heinzle

- M-P02 Regulation of the INF-Gamma/JAK/Stat1 signal transduction pathway
Stephan Beirer, Thomas Meyer, Uwe Vinkemeyer and Thomas Höfer
- M-P05 A domain-oriented approach to the reduction of combinatorial complexity in signal transduction
networks **Holger Conzelmann**, Julio Saez-Rodriguez, Thomas Sauter, Boris Kholodenko and
Ernst-Dieter Gilles
- M-P08 System Properties of the Core Reactions of Apoptosis
Thomas EiBing, Carla Cimattoribus, Frank Allgöwer, Peter Scheurich and Eric Bullinger
- M-P11 Repression of SOX6 transcriptional activity by SUMO modification
Fernandez-Lloris Raquel, Osses Nelson, Jaffray Ellis, Shen LinNan, Vaughan Owen Anthony,
Girdwood David, Bartrons Ramon, Rosa Jose Luis and Ventura Francesc
- M-P14 Modeling the synchronization of circadian oscillators in the suprachiasmatic nucleus
Didier Gonze, Samuel Bernard, Christian Waltermann, Achim Kramer and Hanspeter Herzel
- M-P17 BOOLEAN analysis of the signaling network triggered by neurotrophic factors and extracellular
matrix in sensory neurons. **Mikhail Paveliev**, Maria Lume and Mart Saarma
- M-P20 Analysis of the signaling network involved in the activation of T-Lymphocytes
Julio Saez-Rodriguez, Xiaoqian Wang, Birgit Schoeberl, Steffen Klamt, Jonathan Lindquist,
Stefanie Kliche, Buckhart Schraven and Ernst Dieter Gilles
- M-P23 Retroelement insertion polymorphism in cell line identification.
Svetlana V. Ustyugova, Anna L. Amosova, Yuri B. Lebedev and Eugene D. Sverdlov

Power Poster Presentations

- P-PoP2 Effects of noise in metabolic flux analysis. **Visakan Kadirkamanathan**, Steve Billings,
Sarawan Wongsu, Jing Yang and Philip Wright
- P-PoP5 An adaptive system approach for the modelling of genetic regulatory networks. Glucose
metabolism study in the yeast. **Sinisa Zampera** and **Todor Vujasinovic**
- T-PoP2 Single cell mechanics and mechano signal transduction using a micro-force loading device.
Hao Zhang, Zhiqing Feng, Ning Fang, Vincent Chan and **Kin Liao**
- T-PoP5 Regulatory Network Reconstruction by Integrative Analysis of Cross-Platform Microarray Data.
Jasmine Zhou, Ming-Chih Kao, Haiyan Huang, Angela Wong, Juan Nunez-Iglesias,
Michael Primig, Oscar Aparicio, Caleb Finch, Todd Morgan and Wing Wong
- U-PoP2 Some changes in the composition of nuclear components during cereal seeds germination.
Liya A. Minasbekyan and Poghos H. Vardevanyan
- M-PoP2 SYMBIONIC: A European initiative on the Systems Biology of the neuronal cell **Ivan Arisi**
- M-PoP5 Experimental design for model discrimination in cellular signal transduction
Clemens Kreutz, Jörg Stelling, Thomas Maiwald and **Jens Timmer**

Tuesday

March 15

Breakfast

7:00 - 8:30 am

Tools & Methods (part 2)

Lectures

8:30 am - 10:00 pm

Chair: Karl Kuchler

T-L5 **Jacky Snoep** 8:30 - 9:15
The Silicon Cell approach to building detailed kinetic models of biological systems

T-L6 **Ursula Kummer** 9:15 - 10:00
Mathematical modelling: Choosing the right simulation method

Coffee & Refreshment Break 10:10 - 10:20

Unicellular Organisms (part 1)

Lectures

10:20 am - 12:35 pm

Chair: Stefan Hohmann

U-L1 **Edda Klipp** 10:20 - 11:05
Mathematical modeling of stress response in yeast

U-L2 **Matthias Reuss** 11:05 - 11:50
Hiding behind the population average - cell cycle dynamics of energy metabolism during the lifelines of individual yeast cells

U-L3 **Jörg Stelling** 11:50 - 12:35
Knowledge and data requirements for systems analysis of cellular networks

Lunch & Afternoon Break 12:35 – 13:15

VISIT to SALZBURG 13:30 – 23:00 pm

Buses will leave Hotel at 13:30 pm

Dinner in Salzburg

Return from Salzburg to the venue 22:00 pm

Wednesday

March 16

Breakfast

7:00 - 8:30 am



unicellular Organisms (part 2)

Lectures

8:30 am - 12:30 pm

Chair: Stefan Hohmann

Co-chair: Matthias Reuss

U-L4 **Uwe Sauer** 8:30 - 9:15

In vivo operation of metabolic pathways

U-L5 **Uri Alon** 9:15 - 10:00

Simplicity in biology

Coffee & Refreshment Break 10:00 - 10:20

U-L6 **Barry Wanner** 10:20 - 11:05

Stochastic activation of the response regulator PhoB by noncognate histidine kinases

U-L7 **Masaru Tomita** 11:05 - 11:50

Metabolome analysis and systems biology

Break 11:50 - 12:00

Guided General Discussion: Identifying issues; unicellular organisms 12:00 - 12:30

Lunch & Afternoon Break 12:30 - 4:30 pm

Coffee and Tea Break 4:00 - 4:30 pm



unicellular Organisms

Workshop & Short Talks

4:30 - 6:50 pm

Chair: Matthias Reuss

Co-chair: Stefan Hohmann

U-W1 **Guillaume Beslon** 4:30 - 4:50

Modelling evolution of prokaryotic genomes: an integrative approach

U-W2 **Victor Sourjik** 4:50 - 5:10

Signal processing in bacterial chemotaxis

U-W3 **Bas Teusink** 5:10 - 5:30

Combining experimental data and *in silico* analysis to model the metabolic and regulatory network of *Lactobacillus plantarum*

Coffee & Refreshment Break 5:30 - 5:50

U-S1 **Attila Csikasz-Nagy** 5:50 - 6:05

Modelling fission yeast morphogenesis

U-S2 **Silvia De Monte** 6:05 - 6:20

Metabolic quorum sensing: onset of density-dependent oscillations

U-S3 **Ana Sofia Figueiredo** 6:20 - 6:35

Integration of software tools for the *in silico* design of metabolic pathways using flux balance analysis

U-S4	Douglas Murray	6:35- 6:50
	Uncovering the control of the respiratory clock in yeast	
	Resumed General Discussion: Addressing the issues; unicellular organisms	6:50- 7:30
Dinner		7:30 - 9:00 pm
	Poster Session 3	9:00 - 11:00 pm
	Viewing posters	9:00 - 9:45
	Free poster wandering	9:45 – 10:30
	Round table poster discussion (presenters and teachers only)	10:30 – 11:00

Poster Presentations

- U-S01 Modelling fission yeast morphogenesis. **Attila Csikasz-Nagy**, Bela Gyorffy, Wolfgang Alt, John J. Tyson and Bela Novak
- U-S02 Metabolic quorum sensing: onset of density-dependent oscillations
Silvia De Monte, Francesco d'Ovidio, Sune Danø and Preben Grae Sørensen
- U-S03 Integration of software tools for the *in silico* design of metabolic pathways using flux balance analysis. **Ana Sofia Figueiredo**, Pedro Fernandes, Pedro Pissarra and António Ferreira
- U-S04 Uncovering the control of the respiratory clock in yeast
Douglas B. Murray and Hiroaki Kitano
- M-S01 Inferring feedback mechanisms in cellular transformation due to oncogenic RAS
Nils Bluethgen, Christine Sers, Jana Keil, Szymon M. Kielbasa, Reinhold Schaefer and Hanspeter Herzel
- M-S02 Regulation of MAPK signalling determining cell fate in PC-12 cells - a step beyond biochemistry
Silvia D. Santos, Eli Zamir, Peter Verveer and Philippe Bastiaens
- M-S03 Mathematical modeling of neuronal response to neuropeptides: Angiotensin II signaling via G-protein coupled receptor. **Thomas Sauter**, Rajanikanth Vadigepalli and James Schwabe

- P-P03 Genetic network model for the AP-1 system. **David Camacho** and Roland Eils
- P-P06 A genetical genomics approach to gene network inference. **Alberto de la Fuente**, Bing Liu and Ina Hoeschele
- P-P09 Phylogenetic analysis based on structural information of metabolic networks
Oliver Ebenhöf, Thomas Handorf and Reinhart Heinrich
- P-P12 Scopes: A new concept for the structural analysis of metabolic networks
Thomas Handorf, Oliver Ebenhöf and Reinhart Heinrich
- P-P15 Two Numerical Model Analyses for the Movement of a Restriction Enzyme.
Noriko Hiroi, Akira Funahashi and Hiroaki Kitano
- P-P18 Knowledge discovery by integrated analysis of metabolic and regulatory networks
Hong-Wu Ma and An-Ping Zeng
- P-P21 Investigating the structure of integrated biological networks
Venkata Gopalacharyulu Peddinti, Erno Lindfors and Matej Oresic
- P-P24 Modelling transient dynamics of osmo-stress response in Yeast. **Jörg Schaber**, Bodil Nordlander and Edda Klipp
- P-P27 Nutrient starvation in baker's yeast, and the implication of protein degradation for Vertical Genomics. **Karen van Eunen**, Jildau Bouwman, Sergio Rossell, Rob J.M. Spanning, Barbara M. Bakker and Hans V. Westerhoff

- T-P03 A new Information System to manage and analyse information on biochemical interactions
Holger Dach, Juliane Fluck, Kai Kumpf and Rainer Manthey
- T-P06 Genomic rearrangements : influence of the genetic context on chromosomal dynamics
Emilie Fritsch, Jean-luc Souciet, Serge Potier and Jacky de Montigny
- T-P09 Modelling protein motions for systems biology. **Benjamin A Hall** and Mark Sansom
- T-P12 Systemic models for metabolic dynamics and regulation of gene expression – easy access, retrieval and search for publicly available gene expression data. **Per Harald Jonson** and M. Minna Laine
- T-P15 Automated construction of genetic networks from mutant data
Peter Juvan, Gad Shaulsky and Blaz Zupan
- T-P18 Accelerating the construction of genome-scale metabolic models: a test case for *Lactococcus lactis*. **Richard A. Notebaart**, Frank H.J. van Enckevort, Bas Teusink and Roland J. Siezen
- T-P24 Fokker-Planck equations for IP₃ mediated Calcium dynamics. **Rüdiger Thul** and Martin Falck

- T-P27 The *Genevestigator* gene function discovery engine. **Philip Zimmermann**, *Matthias Hirsch-Hoffmann, Lars Hennig and Wilhelm Gruissem*
- U-P03 Metabolic functions of duplicate genes in *Saccharomyces cerevisiae*
Lars M. Blank, *Lars Küpfer and Uwe Sauer*
- U-P06 Metabolic network analysis in six microbial species. **Tobias Fuhrer**, *Eliane Fischer and Uwe Sauer*
- U-P09 The regulatory circuitry of arabinases in *Bacillus subtilis*. **José M. Inácio** and *Isabel de Sá-Nogueira*
- U-P12 Dynamic on-line investigation of lactic acid bacteria.
Ann Zahle Larsen, *Lars Folke Olsen and Frants Roager Lauritsen*
- U-P15 Adaptive response of the central metabolism in *Escherichia coli* to quantitative modulations of a single enzyme: glucose-6-phosphate dehydrogenase. **Cécile Nicolas**, *Fabien Létisse and Jean-Charles Portais*
- U-P18 Progressive adaptation of *Lactococcus lactis* to stress.
Emma Redon, *Pascal Loubière and Muriel Coccagn-Bousquet*
- U-P21 Some properties and partial purification of *Candida Guilliermondii* NP-4 and *Paramcium Multimcronucleatum* glutaminase. **Ara H. Tamrazyan**, *Misak A. Davtyan and Susanna A. Karapetyan*
- U-P24 Vertical genomics in baker's yeast: adaptation of respiring cells to anaerobic sugar-excess conditions. **Joost van den Brink**, *Pascale Daran-Lapujade, Han de Winde and Jack Pronk*
- U-P27 A Sysytems Biology Strategy For Understanding The Genome-wide Control Of Growth Rate And Metabolic Flux In Yeast. *Jian Wu, Nianshu Zhang, Andy Hayes, Douglas Kell, Stephen Oliver and Jian Wu*
- M-P03 Comprehensive analysis of the cancer Tyrosine Kinome & Phosphatome
Martin Bezler, *Christian Mann, Detlev T. Bartmus, Pjotr Knyazev, Tatjana Knyazeva, Sylvia Streit and Axel Ullrich*
- M-P06 Model building in a systems biology company: the cell cycle and apoptosis
Cathy Derow, *Chris Snell, Christophe Chassagnole, John Savin and David Fell*
- M-P09 Meshfree modelling of biological transport processes in complex domains
Martin Eigel and *Markus Kirkilionis*
- M-P12 Network synchronization from population to cell level
Laurent Gaubert and *Magali Roux-Rouquié*
- M-P15 Modelling, Enzyme kinetics & Fluorescence Imaging of the NF-kappaB Signalling Pathway **Adaoha EC. Ihekweba**, *Rachel Grimley, Neil Benson, David Broomhead and Douglas B. Kell*
- M-P18 A topological analysis of the human transcription factor interacting network
Carlos Rodriguez-Caso, *Miguel Ángel Medina and Ricard V Solé*
- M-P21 Flavo-di-iron proteins: role in microbial detoxification by NO
Francesca Maria Scandurra, *Paolo Sarti, PierLuigi Fiori, Elena Forte, Alessandro Giuffrè, P. Rappelli, G. Sancier, Daniela Mastronicola, Miguel Teixeira and Maurizio Brunori*
- M-P24 RNAi screening for novel components of mammalian Hedgehog and Wnt pathways
Markku Varjosalo, *Antti Oinas and Jussi Taipale*

Power Poster Presentations

- P-PoP3 A new dynamic complexity reduction method for biochemical reaction networks
Dirk Lebiedz, *Jürgen Zobeley, Julia Kammerer and Ursula Kummer*
- T-PoP3 Connectivity matrix for describing all the atom-level connectivities in a given metabolic network and its use for analysis of the network structure. **Jun Ohta**
- T-PoP6 Oxygen consumption and glycolytic redox state in skeletal muscle
Bjørn Quistorff, *Sune Danø, Mads Madsen, Brian Lindegaard Petersen and Peter Fæster Nielsen*
- U-PoP3 Differentiation in a genetic network with duplicate repressors: simulating evolutionary pathways based on Lac mutational data. *Frank Poelwijk, Daniel Kiviet and Sander Tans*
- M-PoP3 *In vitro* systems for modelling of signal transduction in hepatocytes
Patricio Godoy, *Katja Breitkopf, Loredana Ciuculan, Eliza Wiercinska and Steven Dooley*
- M-PoP6 Integration of genomics and proteomics with metabolic/signaling pathways for generating/improving novel anti-cancer drug targets. **He Yang**

Thursday

March 17

Breakfast

7:00 - 8:30 am

Multicellular Organisms

Lectures

8:30 am - 12:30 pm

Chair: Hiraoki Kitano

Co-chair: Marta Cascante

M-L1 **Michel Eichelbaum** 8:30 - 9:15

Pharmacogenomics: a holistic approach to drug organism interaction

M-L2 **Boris Kholodenko** 9:15 - 10:00

Systems biology of receptor tyrosine kinase signaling

Coffee & Refreshment Break 10:00 - 10:20

M-L3 **Nicolas Le Novere** 10:20 - 11:05

Computational systems biology of neuronal signalling

M-L4 **Ursula Klingmüller** 11:05 - 11:50

Signal transduction and cancer – generation of high quality quantitative data

Break 11:50 – 12:00

Guided General Discussion: Identifying issues; multicellular organisms 12:00 - 12:30

Lunch & Afternoon Break 12:30 - 4:30 pm

Coffee and Tea Break 4:00 – 4:30 pm

Multicellular Organisms

Workshop & Short Talks

4:30 -5:55 pm

Chair: Marta Cascante

Co-chair: Hiraoki Kitano

M-W1 **Mariko Hatakeyama** 4:30 - 4:50

Computer simulation analysis of ErbB signaling for understanding of cellular transformation mechanism

M-W2 **Thomas Höfer** 4:50 - 5:10

Integration of signal transduction and cytokine expression in T lymphocytes

M-S1 **Nils Bluethgen** 5:10 - 5:25

Inferring feedback mechanisms in cellular transformation due to oncogenic RAS

M-S2 **Silvia Santos** 5:25 - 5:40

Regulation of MAPK signalling determining cell fate in PC-12 cells - a step beyond biochemistry

M-S3 **Thomas Sauter** 5:40- 5:55

Mathematical modeling of neuronal response to neuropeptides: Angiotensin II signaling via G-protein coupled receptor

Coffee & Refreshment Break 5:55 - 6:15

Resumed General Discussion:Addressing the issues; multicellular organisms 6:15 - 6:45

NovoNordisk Closing Lecture

Denis Noble

7:00 pm – 8:00 pm

Highlights of SysBio2005: From genes to whole organs

Vertical integration using mathematical simulation

Banquet and Farewell Party

8:00 pm - open end

Presentation of “Gosau YOUNG SysBio INVESTIGATOR AWARDS”

8:30 - 8:45

Marta Cascante, Lilia Alberghina, Roel van Driel, Stefan Hohmann

Official Course Closure

8:45 - 9:00

Hans Westerhoff and Karl Kuchler

Friday

March 18

Breakfast

7:00 - 8:30 am

Hotel Check-Out & Departure

7:00 - 11:00 am

End of SysBio 2005

11:00 am

Shuttle Buses to Salzburg (detailed schedule to be announced)