

Biomathematics Workshop

IMPA - Jan. 4 - 14, 2003

Mathematics is having an ever more significant impact in the physical and biological sciences. This is leading to the fall of feudal boundaries between scientific disciplines and the resurgence of interest in the modern as well as the classical techniques of applied mathematics.

The purpose of this two-week workshop is two-fold: On one side it is intended to inspire students and practitioners in the biological sciences to incorporate advanced mathematical techniques in their approach to science. On the other side, it will try to expose research mathematicians from different fields to relevant as well as difficult problems arising from the biological sciences.

The basic format of the workshop, which will take place from Tuesday, Feb 4th till Friday, Feb 14th, will be as follows: Morning (10AM-12 noon) and afternoon (2PM-3PM) contributed presentations. Mini-courses by leading experts in biomathematics: Greg Huber (Boston), Martin Nowak (Harvard), Marcelo Magnasco (Rockefeller and ICTP). Ample time for discussion during the lunch breaks. It will draw upon the reservoir of students and researchers that are present at IMPA during the Summer Session, as well as the cooperation from other institutions in the Rio area, such as LNCC and Instituto de Biofisica (UFRJ) to cite a few. The applied topics that will be covered, include, but are not limited to: quasi-species and universal grammar, evolution of cooperation and fairness, virus dynamics, medical and microscopy imaging, chemotaxy, cell dynamics, biological modeling.

Attendance is open to the members of the scientific, technological, and academic community, and no registration process will take place. The workshop is included in the Millennium Initiative [IM-AGIMB](#), whose sponsorship is gratefully acknowledged.

For further information please see contact:
zubelli@impa.br, bevi@lncc.br, jair@impa.br

Minicourses

Date	Speaker	Title
January 7	Fabio Chalub (Vienna)	Minicurso: Introducao aos Modelos Matemáticos para Quimiotaxia.
January 9	Fabio Chalub (Vienna)	Minicurso: Introducao aos Modelos Matemáticos para Quimiotaxia.
January 14	Jair Koiller (FGV & LNCC)	Movimento Flagelar via Mecanica Geométrica
January 16	Jair Koiller (FGV & LNCC)	Movimento Flagelar via Mecanica Geométrica

January 21	Fabio Chalub (Vienna)	Minicurso: Introducao aos Modelos Matemáticos para Quimiotaxia.
January 23	Raúl A. Feijoo	Um modelo computacional para o sistema cardiovascular humano
January 28	Larry Liebovitch (F.A.U.)	Using Fractals to Understand the Kinetics of Ion Channel Proteins
January 30	Larry Liebovitch (F.A.U.)	The Networks of How Genes Regulate Other Genes
February 4 (3:30 PM)	Greg Huber	Soft geometry: the mathematical bases of cellular structures. Part 1.
February 5 (3:30 PM)	Greg Huber	Soft geometry: the mathematical bases of cellular structures. Part 2.
February 6 (3:30 PM)	Greg Huber	Soft geometry: the mathematical bases of cellular structures. Part 3.
February 7 (3:30 PM)	Greg Huber	Soft geometry: the mathematical bases of cellular structures. Part 4.
February 10 (3:30 PM)	Martin Nowak	From quasispecies to universal grammar.
February 11 (3:30 PM)	Martin Nowak	Evolution of cooperation and fairness.
February 11 (5:00 PM)	Marcelo Magnasco	The dynamical basis of the auditory function. Part 1.
February 13 (3:30 PM)	F. Michor	Mathematical models of cancer initiation.
February 13 (5:00 PM)	Marcelo Magnasco	The dynamical basis of the auditory function. Part 2.
February 14 (3:30 PM)	Martin Nowak	Virus dynamics.
February 18 (5:00 PM)	Marcelo Magnasco	The dynamical basis of the auditory function. Part 3.
February 20 (5:00 PM)	Marcelo Magnasco	The dynamical basis of the auditory function. Part 4.

Final Schedule Overview

First Week - Starting Tuesday, February 4th.

	Tue - Feb. 4	Wed - Feb. 5	Thu - Feb. 6	Fri - Feb. 7
10:00 - 11:00 AM Invited Lectures Room 228	<i>A bioengenharia tecidual na medicina regenerativa.</i> Antonio Carlos Campos Carvalho (IBCCF-UFRJ)	<i>Aplicações de Microscopia Analítica em Biologia.</i> Marcos Farina (ANATOMIA-UFRJ)	<i><u>Modelling Biological systems with delay differential equations.</u></i> <u>Coraci P. Malta</u> , (IF-USP)	<i><u>Modelos de cadeias tróficas.</u></i> Michel Iskin da Silveira Costa (LNCC)
11:00 AM - 12 Noon Invited Lectures Room 228	T.B.A.	<i><u>Genomic research activities at the bioinformatics laboratory- LABINFO-LNCC.</u></i> Ana Teresa Ribeiro Vasconcelos (LNCC)	<i><u>Modelagem e dinâmica molecular aplicada a proteínas e membranas.</u></i> Pedro Geraldo Pascutti (IBCCF-UFRJ)	<i>Numerical Solutions for Medical Applications in Electrical Impedance Tomography.</i> Joyce S. Bevilacqua (SENAC-SP)
12:00-2:00 PM Lunch				
2:00 PM-3:00 PM Invited Presentations Room 236	<i><u>Dinâmica não-linear de filmes líquidos de interesse biológico.</u></i> Paulo M. Bisch (IBCCF-UFRJ)	FREE	<i><u>Medidas de forma e textura no diagnóstico de nódulos pulmonares.</u></i> Paulo Cezar Pinto de Carvalho (IMPA)	<i><u>Modelagem da Mecânica Respiratória</u></i> Walter Zin (IBCCF-UFRJ)
3:30 PM-5:00 PM Minicourses Audit. 1.	<i><u>Soft geometry: the mathematical bases of cellular structures</u></i> <u>Greg Huber</u>	<i><u>Soft geometry: the mathematical bases of cellular structures</u></i> <u>Greg Huber</u>	<i><u>Soft geometry: the mathematical bases of cellular structures</u></i> <u>Greg Huber</u>	<i><u>Soft geometry: the mathematical bases of cellular structures</u></i> <u>Greg Huber</u>

Second Week - Starting Monday, February 10th.

	Mon - Feb. 10	Tue - Feb. 11	Wed - Feb. 12	Thu - Feb. 13	Fri - Feb. 14
10:00-11:00 AM Invited Presentations Room 228	<u>Representacao fractal de membranas confinadas</u> Luiz Bevilacqua (LNCC)	<u>Threshold conditions for infection persistence in complex host-vectors interactions.</u> Eduardo Massad (FMUSP)	FREE DAY	Movimento Biológico. Jair Koiller (FGV & LNCC)	Movimento Flagelar e o Motor Rotatório. Gerusa A. de Araújo (LNCC)
11:00 AM - Noon Invited Presentations Room 228	Experimental Models of Epilepsy, Models What? Esper Cavalheiro (UNIFESP)	Orientation and direction of motion modules in Cebus visual cortex determined by electrophysiological imaging: experimental and modeling constraints. (joint w. A. C. Melo Diogo) Ricardo Gattass (UFRJ)	FREE DAY	<u>Global Stability of Steady Solutions for a Model in Virus Dynamics.</u> Hermano Frid Neto (IMPA)	Crescimento aleatório sobre uma estrutura celular e aspectos competitivos. Leandro Pimentel (IMPA)
12:00-2:00 PM Lunch			FREE DAY		
2:00-3:00 PM Invited Presentations Room 236	<u>Mathematical challenges in biomedical imaging.</u> Jorge P. Zubelli (IMPA)	<u>Quando Modelos Comportamentais Determinísticos Encontram Observações Empíricas: Métodos de Calibração Bayesianos</u> Claudio Struchiner (FIOCRUZ)	FREE DAY	<u>Métodos Matemáticos no Estudo de Redes de Reações Bioquímicas.</u> Fernando de M C Vieira (IBCCF-UFRJ)	O Impacto da Biologia Molecular na Pesquisa da Fisiologia Cardio-Vascular. E. Krieger (USP)
3:30-5:00 PM Minicourses Aud. 1	From quasispecies to universal grammar. <u>Martin Nowak</u>	Evolution of cooperation and fairness. <u>Martin Nowak</u>	FREE DAY	Mathematical models of cancer initiation. Franziska Michor	<u>Virus dynamics.</u> <u>Martin Nowak</u>
5:00-6:30 PM Minicourses Room 228		<u>The dynamical basis of the auditory function. Part 1.</u> <u>Marcelo Magnasco</u>	FREE DAY	<u>The dynamical basis of the auditory function. Part 2.</u> <u>Marcelo Magnasco</u>	

Partial Workshop Participant List

[Ana Teresa Ribeiro Vasconcelos](#) LNCC
[Antonio Carlos Campos de Carvalho](#) IBCCF-UFRJ
[Claudio Struchiner](#) FIOCRUZ
[Coraci P. Malta](#), IF-USP
[Eduardo Massad](#) FMUSP
[Eduardo Krieger](#) USP
[Esper Cavalheiro](#) UNIFESP
[Fernando de M C Vieira](#): IBCCF-UFRJ
[Hermano Frid Neto](#) IMPA
[Jair Koiller](#) LNCC
[Jorge P. Zubelli](#) IMPA
[Joyce S. Bevilacqua](#), SENAC-SP
[Luiz Bevilacqua](#) LNCC
[Michel Iskin da Silveira Costa](#) LNCC
[Paulo Bisch](#) IBCCF-UFRJ
[Paulo Cezar Pinto de Carvalho](#) IMPA
[Pedro Geraldo Pascutti](#) IBCCF-UFRJ
[Ricardo Gattass](#) UFRJ
[Walter Zin](#) IBCCF-UFRJ

Organizers

L. Bevilacqua (LNCC)
Jair Koiller(LNCC&FGV)
W. Zin (IBCCF)
Jorge P. Zubelli (IMPA)