

Coffee Break			
10:30 – 11:30	Th.S. 31: <i>Discrete Dynamics and Numerical Semigroups</i> Clara Grácio Susana Santos Teresa Silva Denise Torrão	Th.S. 26: <i>Graphs and Combinatorics (I)</i> Sofia Pinheiro Fátima Pacheco Inês Barbedo	Th.S. 26: <i>Graphs and Combinatorics (IV)</i> Paula Rama Ricardo Mamede Rui Duarte
Break			
11:45 – 12:45	Th.S. 32: <i>Synchronization and Discrete Dynamics</i> Sara Fernandes Luís Lopes André Albino	Th.S. 26: <i>Graphs and Combinatorics (II)</i> Maria Manuel Torres Teresa Sousa	Th.S. 26: <i>Graphs and Combinatorics (V)</i> Ilda Perez Olga Azenhas
Break			
14:15 – 15:15	Th.S. 9: <i>Dynamics, Modelling and Optimisation</i> Ana I. Pereira Carlos Balsa João P. Almeida Renato Fernandes	Th.S. 26: <i>Graphs and Combinatorics (III)</i> Paula Carvalho Marta Pascoal Vasco Mano	Th.S. 10: <i>Stochastic Models (I)</i> Filipe Martins Ricardo Cruz Mikhail Smilovic
Break			
15:30 – 16:30	Th.S. 6: <i>Bio-Dynamics</i> Isabel Figueiredo Bruno Oliveira João Coelho Joana Becker	Th.S. 11: <i>Biomathematics</i> José Martins Jorge Pereira Rui Santos	Th.S. 10: <i>Stochastic Models (II)</i> Michal Krzeminski Malgorzata Pulka
Coffee Break			
17:00 – 18:00			

Thematic Sessions Schedule: (In progress)

Room: Sala 2, Calouste Gulbenkian Foundation

	September 2nd	September 3rd	September 4th
9:00 – 10:00	Coffee Break		
10:30 – 11:30	Th.S. 24: <i>Mean-Field Models, Optimal Control and Calculus of Variations</i> Gabriele Terrone Edgard Pimentel Rita Gonçalves Ferreira	Th.S. 15: <i>Dynamical models and data analysis in epidemiology (I)</i> Maira Aguiar Filipe Rocha Urszula Skwara	Th.S. 20: <i>Marine Systems for Ocean Exploration and Exploitation: Theory and Practice (I)</i> A. Pascoal F. Lobo Pereira F. Curado
Break			
11:45 – 12:45	Th.S. 25: <i>Statistics in Environmental and Life Sciences</i> Dora Prata Gomes Inês J. Sequeira Vanda Lourenço Isabel Natário	Th.S. 15: <i>Dynamical models and data analysis in epidemiology (II)</i> Luís Mateus Peyman Ghaffari Nico Stollenwerk Max Souza	Th.S. 20: <i>Marine Systems for Ocean Exploration and Exploitation: Theory and Practice (II)</i> A. Silva J. Gomes A. Aguiar
Break			
14:15 – 15:15	Th.S. 17: <i>PDE's and Calculus of Variations</i> Graça Carita José Maria Gomes Giovanni Pisante	Th.S. 13: <i>Extremes and other statistical properties of dynamical systems</i> Laura Cavalcante Hale Aytac	Th.S. 22: <i>Dynamic Optimization: Applications to Economics and Management</i> Armando Mendes Jorge Santos Luís Cavique Santos Orlando Gomes
Break			
15:30 – 16:30	Th.S. 16: <i>Discrete-valued time series</i> Maria Eduarda Silva Isabel Pereira Magda Monteiro Maria da Conceição Costa	Th.S. 14: <i>Economic dynamics and computation</i> Tiago Pinheiro Paulo Mota Óscar Afonso Pedro Mazedo Gil	Th.S. 30: <i>Symbolic dynamics and Lorenz-like knots</i> Luís Silva Nuno Franco Paulo Gomes Pedro Simões
Coffee Break			
17:00 – 18:00			

Thematic Sessions (in progress):

1. Title: Bayesian Statistics: Applications in Biology and Ecology

Organizer: *Luís Silva*

CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, Universidade dos Açores

Speakers:

- João Casaca, Laboratório Nacional de Engenharia Civil: "Bayesian inference: general framework"
- Luís Silva, Departamento de Biologia, Universidade dos Açores: "Multinomial and Dirichlet distributions in Bayesian inference: applications to Biology and Ecology"
- Giovanni L. Silva, Departamento de Matemática, Instituto Superior Técnico, Universidade Técnica de Lisboa: "A Bayesian spatio-temporal analysis of forest fires in Portugal"
- Francesco Minunno, PhD programme in Forestry Modelling, Instituto Superior de Agronomia, Universidade Técnica de Lisboa: "Selecting parameters for Bayesian calibration of a process-based model: A methodology based on canonical correlation analysis"

2. Title: Marine Life in the Wild Wider Ocean

Organizer: *Ricardo Serrão Santos*

Centro do IMAR da Universidade dos Açores (IMAR-DOP/UAc) & LARSyS – Horta/Açores

Speakers:

- Telmo Morato, University of the Azores: "Seamounts are hotspots of pelagic biodiversity in the open ocean"
- Fernando Tempera, IMAR – Instituto do Mar, University of the Azores e LARSyS: "Predicting deep-sea biological distributions using scarce information"
- Pedro Afonso, Centro do IMAR da Universidade dos Açores (IMAR-DOP/UAc) & LARSyS Laboratório Associado: "Fish in space: Modeling movements and essential habitat"

3. Title: Biological Invasions in the Azores

Organizer: *Ricardo Teixeira*

Departamento de Matemática da Universidade dos Açores

Speakers:

- João Canning-Clode, Centre of IMAR of the University of the Azores, Department of Oceanography and Fisheries/UAz & LARSyS Associated Laboratory: "Marine invasions in offshore islands: a case study from the Macaronesia region"
- Luís Silva, CIBIO, Centro de Investigação em Biodiversidade e Recursos Genéticos, InBIO Laboratório Associado, Pólo dos Açores, Departamento de Biologia, Universidade dos Açores: "Invasions versus endemisms: quantitative approaches to the study of invasive and

Speakers:

- Sofia Pinheiro, Univ. de Aveiro: "The maximum k-regular induced subgraph problem"
- Fátima Pacheco, Inst. Politécnico de Bragança: "(0,2)-regular sets and applications"
- Inês Barbedo, Inst. Politécnico de Bragança: "The construction of the poset of regular exceptional graphs using equitable partitions"
- Maria Manuel Torres, Univ. de Lisboa: "Matchings and orthogonality of symmetrized tensors"
- Teresa Sousa, Univ. Nova de Lisboa: "Graph Decomposition: A blend of Turán numbers and Ramsey numbers"
- Paula Carvalho, Univ. de Aveiro: "Topological Indices of graphs"
- Marta Pascoal, Univ. de Coimbra: "Min-max regret robust shortest path problem in a finite multi-scenario model"
- Vasco Mano, Univ. de Porto: "A Generalization of the Krein parameters and some admissibility conditions for strongly regular graphs"
- Paula Rama, Univ. de Aveiro: "Some results on the modified Schultz index"
- Ricardo Mamede, Univ. de Coimbra: "Singleton free set partitions avoiding a 3-element set"
- Rui Duarte, Univ. de Aveiro: "Maps and hypermaps with large symmetry group"
- Ilda Perez, Univ. de Lisboa: "Shannon switching games and directed variants"
- Olga Azenhas, Univ. de Coimbra: "Growth diagrams, crystal operators and Cauchy kernel expansions"

27. Title: Chaotic Dynamics in Growth modelsOrganizer: *José Leonel Rocha*

Instituto Superior de Engenharia de Lisboa -ISEL, IPL

Speakers:

- Sandra M. Aleixo, Instituto Superior de Engenharia de Lisboa -ISEL, IPL: "An Extension of Gompertzian Growth Dynamics: Weibull and Fréchet Models"
- Acilina Caneco, Instituto Superior de Engenharia de Lisboa -ISEL, IPL: "Synchronization in Richards' Chaotic Systems"

28. Title: Piecewise smooth dynamicsOrganizer: *José Pedro Gaivão*

ISEG, UTL

Speakers:

- Alexandre Plakhov, Universidade de Aveiro: "Invisibility and retro-reflection in billiards"
- Paulo Brito, ISEG-UTL: "A joint discontinuity and singularity induced bifurcation arising in a Cournot-Ramsey model"
- Alessandro Margheri, FCUL: "Complex dynamics in pendulum-type equations with variable length"

29. Title: Some economic applicationsOrganizer: *Alberto A. Álvarez López*

UNED

Speakers:

- Orlando Montoro Peinado, UNED: "Emancipation and Household Formation"
- Meliyara Consuegra, UNED: "Quantification of functional efficiency in energy futures markets"
- Eduardo Oliva, UNED: "Entropy and negentropy: applications in Game Theory"
- Alberto A. Álvarez-López, UNED: "Properties and comparative-static effects in models of decision under uncertainty: applications to the theory of the firm"

30. Title: Symbolic dynamics and Lorenz-like knotsOrganizer: *Luís Silva*

ISEL

Speakers:

- Luís Silva, CIMA-UE, ISEL Lisbon: "Invariants of templates, knots and links generated by renormalizable Lorenz maps"
- Nuno Franco, CIMA-UE, University of Évora: "Thurston's classification of a family of Lorenz knots"
- Paulo Gomes, ISEL-Lisbon: "Lorenz braids, symbolic dynamics and hyperbolic knots"
- Pedro Simões, University of Évora: "Genus for knots and links in renormalizable templates with several branch nodes"

31. Title: Discrete Dynamics and Numerical SemigroupsOrganizer: *Sara Fernandes*

Universidade de Évora

Speakers:

- Clara Grácio, Universidade de Évora: "Ihara zeta function, symbolic dynamics and seismic events networks"
- Susana Santos, PhD student Universidade de Évora: "Discrete Dynamical Systems and Numerical Semigroups"
- Teresa Silva, PhD student Universidade de Évora e ISEL: "About equilibrium distributions of discrete non autonomous systems"
- Denise Torrão, PhD student Universidade de Évora: "On the enumeration of the set of saturated numerical semigroups with fixed Frobenius number"

32. Title: Synchronization and Discrete DynamicsOrganizer: *Clara Grácio*

Universidade de Évora

Speakers:

- Sara Fernandes, Universidade de Évora: "Conductance and clique formation and its applications"
- Luís Lopes, PhD student Universidade de Évora e ISEL: "Linear couplings", "commanded couplings" and their synchronization"
- André Albino, PhD student Universidade de Évora: "Analyze of dynamic behavior of Burridge Knopoff model in synchronized and nonsynchronized regime: potential implications"

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Chapter 1

Determination of $(0, 2)$ –regular sets in graphs and applications

Domingos M. Cardoso, Carlos J. Luz and Maria F. Pacheco

Abstract In this paper, relevant results about the determination of (κ, τ) -regular sets, using the main eigenvalues of a graph, are reviewed and some results about the determination of $(0, 2)$ -regular sets are introduced. An algorithm for that purpose is also described. As an illustration, this algorithm is applied to the determination of maximum matchings in arbitrary graphs.

Key words: $(0, 2)$ -regular sets, main eigenvalues, walk matrix

1.1 Introduction

All graphs considered throughout this paper are simple (with no loops nor multiple edges), undirected and have order n . $V(G) = \{1, 2, \dots, n\}$ and $E(G)$ denote, respectively, the vertex and the edge sets of G and ij represents the edge linking nodes i and j of $V(G)$. If $i \in V(G)$, then the vertex set denoted by $N_G(i) = \{j \in V(G) : ij \in E(G)\}$ is called neighbourhood of i . Additionally, $N_G[i]$ denotes the closed neighbourhood of vertex i (that is, $N_G[i] = N_G(i) \cup \{i\}$). Given a graph G and a set of vertices $U \subset V(G)$, the subgraph of G induced by U , $G[U]$, is such that $V(G[U]) = U$ and $E(G[U]) = \{ij : i, j \in U \wedge ij \in E(G)\}$. A (κ, τ) -regular set of a

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