Welcome to Applied Mathematics Perspectives, a sequence of workshops supporting the flagship ICIAM 2011 meeting of the Applied Mathematics community.

Although the historical roots of Applied Mathematics lie in applied analysis and the development of Newtonian physics, today Applied Mathematics is a far reaching set of interwoven disciplines and skills, which are applied to understanding every facet of nature, science, industry and modern life. This dynamic and ever-changing field includes classical mathematical areas (differential equations, numerical analysis, asymptotic and variational methods, applied probability), all pursued from the application perspective, as well as areas such as applied mechanics and fluid dynamics. Each of these areas advances apace, embracing in particular high speed computation, but newer areas are also intertwined into the applied mathematics fabric. The workshops of Applied Mathematic Perspectives 2011 reflect the diversity and strengths of applied mathematics today.

This sequence of workshops has been supported by PIMS, MITACS, BIRS, CAIMS/SCMAI. Substantial travel funds have been awarded to US participants by the NSF. Local support at UBC has come from PIMS, the UBC Department of Mathematics and the Institute of Applied Mathematics. We thank these organisations for their generosity and help in making this a successful scientific event. We also acknowledge with gratitude the contributions of members of the local organising committee and scientific committee.

Visit the official website: http://www.mitacs.ca/goto/amp2011

Local Organising Committee:
I. Frigaard (University of British Columbia)
T. Hillen (University of Alberta)
B. Khouider (University of Victoria)
M. Lamoureux (University of Calgary)
R. LeVeque (University of Washington)
N. Nigam (Simon Fraser University)
R. Russell (Simon Fraser University)
R. Spiteri (University of Saskatchewan)
M. Ward (University of British Columbia)

Scientific Committee
R. Craster (Imperial College, UK)
M. Davidson (University of Western Ontario)
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G. Homsy (University of British Columbia)
S. Howison (Oxford University, UK)
H. Othmer (University of Minnesota, US)
M. Overton (Courant Institute, US)
O. Scherzer (Vienna, Austria)
R. Spiteri (University of Saskatchewan)

Delay Differential Equations in Applications: Common Themes and Methods
Delay Differential Equations in Applications: Common Themes and Methods

When delay effects are included in mathematical models one obtains differential equations with constant, time varying, distributed and/or state-dependent delays. Since related equations arise in a multitude of disciplines there is a need for good communication between these disciplines to avoid repetition of effort on similar problems and to ensure advances made in one application area propagate in a timely fashion to other fields. Therefore this workshop aims to bring together leading international experts from key application fields and from the theory and numerical analysis of delay differential equations, with the goal of exploring common themes that arise when the effects of delay need to be modelled and analysed.

Featured application areas

- laser physics
- electronic engineering
- communication systems
- mechanical testing environments
- traffic flows
- control theory
- population dynamics
- dynamics of neuronal networks
- networks with delays
- disease dynamics

Common themes and methods:

- systems with spatial extent and delay
- effects of delay distribution
- theory of state-dependent delays
- stable integration methods
- continuation and bifurcation methods

Organizers :::
Sue Ann Campbell, University of Waterloo, Canada (sacampbell@uwaterloo.ca)
Tony Humphries, McGill University, Canada (tony.humphries@mcgill.ca)
Bernd Krauskopf, University of Bristol, UK (jan.sieber@port.ac.uk)
Jan Sieber, University of Portsmouth, UK (B.Krauskopf@bristol.ac.uk)

Locations :::
See UBC Map for directions
Workshops - MATH 104
Coffee and lunch breaks - PIMS offices, downstairs (WMAX 110)
SCHEDULE :::

Wednesday, July 13

6:00pm Registration and reception at Mahoney’s Irish Pub

Thursday, July 14

9 - 9.30am  Fatihcan Atay, Max Planck Institute for Mathematics in the Sciences  
Networked systems with delays

9.30-10am  Ingo Fischer, Universitat de les Illes Balears - CSIC  
Dynamics and Synchronization of Delay-Coupled Semiconductor Lasers

10 - 11am  Coffee and discussion

11-11.30am  Hans-Otto Walther, Universitaet Giessen  
Unbounded state-dependent delay

11.30-12noon  John Mallet-Paret, Brown University  
Tensor Products, Positive Operators, and DDEs

12 - 2pm  Lunch

2 - 2.30pm  Laurent Larger, Université de Franche-Comté  
Electro-optic delay dynamics: an application for each  
dynamical regime, from chaos to fixed point through limit cycle

2.30 - 3pm  Serhiy Yanchuk, Humboldt University of Berlin  
Emergence of relative periodic orbits in systems with  
time-delay and rotational symmetry

3 - 3.30pm  Coffee

3.30pm  Discussion Time

6:30pm  Dinner cruise, see last page for details

Friday, July 15

9- 9.30am  Gergely Rost, University of Szeged  
Persistence in epidemic models with infinite delay

9.30-10am  David Barton, University of Bristol  
Oscillatory dynamics of a structured consumer resource model

10 - 11am  Coffee and discussion
<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
<th>Topic</th>
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</thead>
<tbody>
<tr>
<td>11-11.30am</td>
<td>Rongsong Liu, University of Wyoming</td>
<td>Modeling the Dynamics of Woody Plant-Herbivore Interactions with Age-Dependent Toxicity</td>
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<tr>
<td>11.30-12noon</td>
<td>Dimitri Breda, University of Udine</td>
<td>A numerical approach to the stability analysis of structured population dynamics</td>
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<tr>
<td>12 - 2pm</td>
<td>Lunch</td>
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<tr>
<td>2 - 2.30pm</td>
<td>Maria Barbarossa, Technical University Munich</td>
<td>Neutral state-dependent delay equations for population dynamics</td>
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<tr>
<td>2.30 - 3pm</td>
<td>Nicola Guglielmi, Università dell’Aquila</td>
<td>Regularization and asymptotic expansions for neutral DDEs</td>
</tr>
<tr>
<td>3 - 4pm</td>
<td>Coffee and poster session</td>
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<tr>
<td>4pm onwards</td>
<td>Discussion Time</td>
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<tr>
<td>6:30pm</td>
<td>Reception at the SAGE BISTRO, see UBC map for location</td>
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**Saturday July 16**

<table>
<thead>
<tr>
<th>Time</th>
<th>Speaker</th>
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<tbody>
<tr>
<td>9- 9.30am</td>
<td>John Milton, The Claremont Colleges</td>
<td>Two-delay model for stick balancing: On the road to drift and act</td>
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<tr>
<td>9.30-10am</td>
<td>David Simpson, University of British Columbia</td>
<td>Effects of State Dependent Switching Control in a Prototypical Balancing Model</td>
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<tr>
<td>10 - 11am</td>
<td>Coffee and discussion</td>
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<tr>
<td>11-11.30am</td>
<td>Eckehard Schoell, Technical University Berlin</td>
<td>Controlling dynamics of complex networks with delayed coupling</td>
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<tr>
<td>11.30-12noon</td>
<td>Gabor Orosz, University of Michigan</td>
<td>Dynamics and control of neural networks and gene regulatory circuits with time delay</td>
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<tr>
<td>12 - 2pm</td>
<td>Lunch</td>
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<tr>
<td>2 - 2.30pm</td>
<td>Thomas Erneux, Université Libre de Bruxelles</td>
<td>Asymmetric tau-periodic square-waves: experiments and theory</td>
</tr>
<tr>
<td>2.30 - 3pm</td>
<td>Jianhong Wu, York University</td>
<td>Pattern recognition with delay: the nonlinear dynamics foundation behind a subspace clustering algorithm</td>
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<tr>
<td>3pm</td>
<td>Closing Remarks, coffee and discussion.</td>
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*Delay Differential Equations in Applications: Common Themes and Methods*
Posters:

* indicates presenter if more than one author

**Angelean Hendrix, North Carolina State University**
“Introduction of Androgens into Delay Differential Equation model of the Female Reproductive System.”

**Jonathan L. Mitchell and Thomas Carr*, Southern Methodist University**
“The Effect of State-Dependent Delay on a Weakly-Damped Nonlinear Oscillator”

**Maria Barbarossa, Technical University Munich**
“Delay equations modeling the effects of phase-specific drugs and immunotherapy on proliferating tumor cells”

**Felicia Magpantay, McGill University**
“Stability of a state dependent DDE using Lyapunov-Razumikhin-like stability theorems”

**Xiang-Sheng Wang, York University**
“Approximating periodic solutions and accurate estimation of their Floquet multipliers for periodic DDEs from seasonal bird migration”

**Simon Lenz, Heidelberg University**
“Derivative Computation and Parameter Estimation for DDE Models in Biology”
Delay Differential Equations in Applications: Common Themes and Methods
<table>
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<tr>
<td>Fatihcan Atay</td>
<td>Max Planck Institute</td>
<td><a href="mailto:fatay@mis.mpg.de">fatay@mis.mpg.de</a></td>
</tr>
<tr>
<td>Maria Barbarossa</td>
<td>Technical University Munich</td>
<td><a href="mailto:barbarossa@ma.tum.de">barbarossa@ma.tum.de</a></td>
</tr>
<tr>
<td>David Barton</td>
<td>University of Bristol</td>
<td><a href="mailto:david.barton@bristol.ac.uk">david.barton@bristol.ac.uk</a></td>
</tr>
<tr>
<td>Jacques Bélair</td>
<td>Université de Montréal</td>
<td><a href="mailto:belair@crm.umontreal.ca">belair@crm.umontreal.ca</a></td>
</tr>
<tr>
<td>Dimitri Breda</td>
<td>University of Udine</td>
<td><a href="mailto:dimitri.breda@uniud.it">dimitri.breda@uniud.it</a></td>
</tr>
<tr>
<td>Renato Calleja</td>
<td>McGill University</td>
<td><a href="mailto:calleja@math.mcgill.ca">calleja@math.mcgill.ca</a></td>
</tr>
<tr>
<td>Sue Ann Campbell</td>
<td>University of Waterloo</td>
<td><a href="mailto:sacampbell@uwaterloo.ca">sacampbell@uwaterloo.ca</a></td>
</tr>
<tr>
<td>Thomas Carr</td>
<td>Southern Methodist University</td>
<td><a href="mailto:tcarr@smu.edu">tcarr@smu.edu</a></td>
</tr>
<tr>
<td>Christella Chavez</td>
<td>University of Oklahoma</td>
<td><a href="mailto:chriss.chavez@ou.edu">chriss.chavez@ou.edu</a></td>
</tr>
<tr>
<td>Maria De Luis Balaguer</td>
<td>Université Libre de Bruxelles</td>
<td><a href="mailto:madeluis@ncsu.edu">madeluis@ncsu.edu</a></td>
</tr>
<tr>
<td>Thomas Erneux</td>
<td>IFISC (UIB-CSIC)</td>
<td><a href="mailto:terneux@ulb.ac.be">terneux@ulb.ac.be</a></td>
</tr>
<tr>
<td>Ingo Fischer</td>
<td>Università dell’Aquila</td>
<td><a href="mailto:ingo@ifisc.ub-csic.es">ingo@ifisc.ub-csic.es</a></td>
</tr>
<tr>
<td>Nicola Guglielmi</td>
<td>North Carolina State University</td>
<td><a href="mailto:guglielm@univaq.it">guglielm@univaq.it</a></td>
</tr>
<tr>
<td>Angelean Hendrix</td>
<td>McGill University</td>
<td><a href="mailto:aohendri@ncsu.edu">aohendri@ncsu.edu</a></td>
</tr>
<tr>
<td>Antony Humphries</td>
<td>University of Bristol</td>
<td><a href="mailto:tony.humphries@mcgill.ca">tony.humphries@mcgill.ca</a></td>
</tr>
<tr>
<td>Bernd Krauskopf</td>
<td>University of British Columbia</td>
<td><a href="mailto:b.krauskopf@bristol.ac.uk">b.krauskopf@bristol.ac.uk</a></td>
</tr>
<tr>
<td>Rachel Kuske</td>
<td>Univ. Franche-Comte</td>
<td><a href="mailto:rachel@math.ubc.ca">rachel@math.ubc.ca</a></td>
</tr>
<tr>
<td>Laurent Larger</td>
<td>Heidelberg University</td>
<td><a href="mailto:laurent.larger@univ-fcomte.fr">laurent.larger@univ-fcomte.fr</a></td>
</tr>
<tr>
<td>Simon Lenz</td>
<td>University of Wyoming</td>
<td><a href="mailto:rongsong.liu@uwyo.edu">rongsong.liu@uwyo.edu</a></td>
</tr>
<tr>
<td>Rongsong Liu</td>
<td>McGill University</td>
<td><a href="mailto:magpantay@math.mcgill.ca">magpantay@math.mcgill.ca</a></td>
</tr>
<tr>
<td>Felicia Maria G, Magpantay</td>
<td>Brown University</td>
<td><a href="mailto:jmp@dam.brown.edu">jmp@dam.brown.edu</a></td>
</tr>
<tr>
<td>John Mallet-Paret</td>
<td>The Claremont Colleges</td>
<td><a href="mailto:jmlilton@jsd.claremont.edu">jmlilton@jsd.claremont.edu</a></td>
</tr>
<tr>
<td>John Milton</td>
<td>University of Michigan</td>
<td><a href="mailto:orosz@umich.edu">orosz@umich.edu</a></td>
</tr>
<tr>
<td>Gabor Orosz</td>
<td>University of Szeged</td>
<td><a href="mailto:rost@math.u-szeged.hu">rost@math.u-szeged.hu</a></td>
</tr>
<tr>
<td>Gergely Rost</td>
<td>Technical University Berlin</td>
<td><a href="mailto:schoell@physik.tu-berlin.de">schoell@physik.tu-berlin.de</a></td>
</tr>
<tr>
<td>Eckehard Schoell</td>
<td>University of Portsmouth</td>
<td><a href="mailto:jan.sieber@port.ac.uk">jan.sieber@port.ac.uk</a></td>
</tr>
<tr>
<td>Jan Sieber</td>
<td>University of British Columbia</td>
<td><a href="mailto:dsimpson@math.ubc.ca">dsimpson@math.ubc.ca</a></td>
</tr>
<tr>
<td>David Simpson</td>
<td>University of Victoria</td>
<td><a href="mailto:wft@math.ubc.ca">wft@math.ubc.ca</a></td>
</tr>
<tr>
<td>William Thompson</td>
<td>Università degli Studi di Udine</td>
<td><a href="mailto:rossana.vermiglio@uniud.it">rossana.vermiglio@uniud.it</a></td>
</tr>
<tr>
<td>Rossana Vermiglio</td>
<td>Universitaet Giessen</td>
<td><a href="mailto:Hans-Otto.Walther@math.uni-giessen.de">Hans-Otto.Walther@math.uni-giessen.de</a></td>
</tr>
<tr>
<td>Hans-Otto Walther</td>
<td>York University</td>
<td><a href="mailto:xswang4@mail.ustc.edu.cn">xswang4@mail.ustc.edu.cn</a></td>
</tr>
<tr>
<td>Xiangsheng Wang</td>
<td>University of New Brunswick</td>
<td><a href="mailto:lwang2@unb.ca">lwang2@unb.ca</a></td>
</tr>
<tr>
<td>Lin Wang</td>
<td>York University</td>
<td><a href="mailto:taraf@yorku.ca">taraf@yorku.ca</a></td>
</tr>
<tr>
<td>Jianhong Wu</td>
<td>Humboldt University of Berlin</td>
<td><a href="mailto:yanchuk@math.hu-berlin.de">yanchuk@math.hu-berlin.de</a></td>
</tr>
<tr>
<td>Serhiy Yanchuk</td>
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WEBSITES
:: http://www.ubc.ca/vancouver/about/services.html
:: http://www.ubc.ca/about/maps.html

WIRELESS INTERNET - Free wireless internet is available at the PIMS office (WMAX bldg) during breaks. Password required, signs will be posted in the office. Please abide by UBC internet use policy http://www.universitycounsel.ubc.ca/files/2010/08/policy104df

FOOD
:: in the Student Union Building - 6138 Student Union Boulevard
   : The Gallery (Montreal-style bagels)
   : The Pit Pub (quarter pound patties and burger specials everyday)
   : Pie R Squared (pizza)
:: in the University Village - corner of University Boulevard & Western Pkwy
   : One More Sushi (located on the 2nd floor, this is a sushi restaurant)
   : Curry Point (in the underground foodcourt you’ll find many foods including curry)
   : Pita Pit (healthy and filling wraps)

RECREATIONAL ACTIVITIES, VISIT HTTP://WWW.REC.UBC.CA/
:: The Birdcoop Fitness Centre (fitness gym $9 daily drop-in)
   : 6000 Student Union Blvd. - in the Student Recreation Centre
:: Thunderbird Arena (skating arena)
   : 6066 Thunderbird Blvd.
:: UBC Aquatic Centre (pool)
   : 6121 University Blvd.
:: Pacific Spirit Regional Park (hiking and biking trails)
   : parking available at 4915 W. 16th ave.
:: UBC Tennis Centre (indoor courts $16/hr and outdoor courts $5/hr)
   : 6160 Thunderbird Blvd.
:: UBC Botanical Garden (Canada’s oldest university garden $12 entrance fee)
   : 6804 SW Marine Drive
:: Norm Theatre (check the schedule http://ubcfilmsociety.com/ $5 admission)

EMERGENCY/FIRE/SAFETY
*** in an emergency dial 911 for Police, Fire, or Ambulance
:: UBC Campus Security

HEALTH
:: University Village Medical & Dental Clinic (open Mon-Fri 8am-6pm)
   : 604-222-2273
   : 228-2155 Allison Road
TRANSPORTATION

:: Vancouver Taxi (604-871-1111) or Yellow Cab (604-681-1111)

:: Public Transit
  : a single fare is valid for 90 minutes (hop on and off as you please)
  : one zone - $2.50, two zone - $3.75, three zone - $5.00
  : www.translink.ca
  : UBC Bus Loop is located at 1950 Wesbrook Mall

TOURISM VANCOUVER

:: visit www.tourismvancouver.com or call 1-800-663-6000

:: Granville Island - bustling marketplaces with food and crafts
  : http://www.granvilleisland.bc.ca

:: Telus World of Science - omnimax theatre and lots to discover
  : http://www.scienceworld.bc.ca

:: Grouse Mountain - challenge yourself to a hike & enjoy the view
  : http://www.grousemountain.com/summer/

:: Chinatown - visit the weekend Night Market
  : http://www.vancouverchinatown.ca

:: Gastown - experience the birthplace of Vancouver
  : http://www.gastown.org

:: Robson Street - shop ‘til you drop
  : http://www.robsonstreet.ca

:: Metropolis at Metrotown - shop, eat, and play
  : http://www.metropolis.shopping.ca

:: English Bay - visit the beach

:: Vancouver Aquarium - over 70,000 amazing animals
  : http://www.vanaqua.org

:: Vancouver Public Library - pick up a book for some quiet time
  : http://www.vpl.ca
Organized activities

Wednesday July 13: 6pm
Registration and dinner reception in Mahonys Irish Pub, see UBC map for location.

Thursday July 14: Dinner cruise

Our workshop banquet will take place on the M.V. Burrard Queen as we cruise around Vancouver Harbour. Boarding will take place from 6.30pm on Thursday 14th and the ship departs at 7.15pm (return around 10.30). Please don’t be late, the ship doesn’t wait!

The dock is located on the West side of Granville Island, to the left of Bridges’ Restaurant. Granville Island is accessible by bus. Your workshop organiser will provide you with bus tickets. From UBC take either #84 (bay 14) from the North bus loop or #4 (bay 14) from the Trolley bus terminal. Ask the bus driver for the nearest stop to get off (4th avenue at Fir St). See UBC map for bus loop location.
Link to map: http://maps.google.ca/maps/ms?ie=UTF8&hl=en&msa=0&ll=49.271949,-123.134723&tsp n=0.020805,0.038581&z=15&msid=200222965460381506379.0004a538d61370ed2d31d

Allow 45 minutes for the bus + walk to the boat. Granville Island is a pleasant tourist area with indoor market, boutique shops, restaurants etc., to entertain you.

Friday July 15: 6.30pm
Formal reception at the Sage Bistro, on UBC Campus, see UBC map.