

Richard Taylor

Curriculum Vitae

Dept. of Mathematics & Statistics
Thompson Rivers University
Kamloops BC, Canada
☎ 250 371 5987
FAX 250 371 5675
✉ rtaylor@tru.ca
🏠 faculty.tru.ca/rtaylor



Education

- 1999–2004 **Ph.D., Applied Mathematics**, *University of Waterloo*, Waterloo, Canada.
Probabilistic properties of delay differential equations. Supervisor: Sue Ann Campbell
- 1998–1999 **M.Sc., Geophysics**, *University of British Columbia*, Vancouver, Canada.
Modeling elastic wave velocities in porous media. Supervisor: Rosemary Knight
- 1993–1998 **B.Sc. (Hons), Physics**, *University of British Columbia*, Vancouver, Canada.
Undergraduate thesis: Modeling evaporative drying in porous rock.

Employment

- 2005–present **Senior Lecturer**, *Thompson Rivers University, Dept. of Mathematics & Statistics and Dept. of Physics*, Kamloops BC, Full time.
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|-----------------------------------|--|
| MATH 1100 – Finite Mathematics | MATH 2240/2650 – Differential Equations I |
| MATH 1140/1150 – Calculus I | MATH 3160 – Differential Equations II |
| MATH 1240 – Calculus II | MATH 3000 – Complex Variables |
| MATH 2110 – Calculus III | MATH 3650 – Numerical Analysis |
| MATH 3170 – Calculus IV | MATH 4980 – Calculus of Variations |
| MATH 1300/2120 – Linear Algebra I | MATH 4990 – Mathematics Demonstrations |
| MATH 267 – Digital Signals | MATH 4990 – Mathematics of Music |
| PHYS 1150 – Mechanics & Waves | MATH 4990 – Kinematics & Dynamics for Robotics |
| PHYS 3200 – Advanced Mechanics | |
- Associate Graduate Instructor since 2015.
- Summer 2005 **Instructor**, *Capilano College, Dept. of Mathematics*, North Vancouver BC, Full time sessional contract.
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| MATH 105 – Pre-Calculus | MATH 124 – Calculus II |
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- 2003–2005 **Assistant Professor**, *Okanagan University College, Dept. of Mathematics and Dept. of Physics*, Salmon Arm BC, Full time limited term.
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| MATH 111 – Finite Mathematics | MATH 221 – Linear Algebra |
| MATH 112 – Calculus I | PHYS 111 – General Physics I |
| MATH 122 – Calculus II | PHYS 121 – General Physics II |
- Winter 2003 **Instructor**, *British Columbia Institute of Technology, Dept. of Mathematics*, Burnaby BC, Full time sessional contract.
- COMP 3751 – Mathematical Tools for Computing (7 lab sections using Maple)

- Fall 2002 **Instructor**, *University of British Columbia, Dept. of Mathematics*, Vancouver BC, Part time sessional contract.
MATH 180 – Differential Calculus with Physical Applications.
- Fall 2001 **Instructor**, *University of Waterloo, Faculty of Mathematics*, Waterloo ON, Part time sessional contract.
MATH 137 – Calculus for Honours Math.
- 1999–2001 **Graduate Teaching Assistant**, *University of Waterloo, Faculty of Mathematics*, Waterloo ON, Part time.

Publications

Peer Reviewed

- 2013 B.M.C. Friedman, M.G. Abraham, M. Paetkau, S.R. Taylor, and C. Ross Friedman. Use of a varying turn-density coil (VTDC) to generate a constant-gradient magnetic field and to demonstrate the magnetic force on a permanent magnet. *Canadian Journal of Physics*, 91(3), 226–230.
- 2007 S. Richard Taylor and Sue Ann Campbell, Approximating Chaotic Saddles for Delay Differential Equations. *Phys. Rev. E* 75(4).
- 2003 S. Richard Taylor and Rosemary J. Knight, Incorporating mechanisms of fluid pressure relaxation into inclusion-based models of elastic wave velocities. *Geophysics* 68(4), 1173–81, 2003.
- 2003 S. Richard Taylor and Rosemary J. Knight, An inclusion-based model of elastic wave velocities incorporating patch scale fluid pressure relaxation. *Geophysics* 68(5), 1503–9, 2003.
- 1996 Richard Taylor and Rosemary Knight, Numerical Modeling of Evaporation in Porous Rock Samples, Fall Meeting of the American Geophysical Union, San Francisco, December 1996. Abstract in *EOS Trans. AGU*, 77(46), Fall Meet. Suppl., F746.

Non-Peer Reviewed Technical Articles

- Aug 2015 A Parametric Allpass for Crossover Phase Alignment. Design of a new allpass digital filter for accurate phase alignment of audio crossovers in active loudspeakers. rtaylor.sites.tru.ca/?p=491
- Aug 2015 Dither and Ecasound. Quantization distortion measurements of a widely-used piece of software for audio recording and processing, arguing the need to implement dither to eliminate quantization distortion and increase dynamic range. rtaylor.sites.tru.ca/?p=464
- Nov 2014 Lateral Reflections in Rectangular Rooms. Software source code to calculate and graph the first-reflection time for sound in a small room, to determine loudspeaker placements that allow for operation of the precedence effect and maximize accuracy of stereo imaging. rtaylor.sites.tru.ca/?p=464

- Sept 2013 An R Script for ABX Testing. Software source code to implement a system for A/B/X comparison testing to detect perceptual differences between sound sources. rtaylor.sites.tru.ca/?p=350
- Aug 2013 Digital Allpass Filters for Crossover Phase Equalization. Design of a new allpass digital filter via the Remez algorithm, for extremely accurate phase alignment of audio crossovers in active loudspeakers. rtaylor.sites.tru.ca/?p=328
- May 2013 LADSPA Plugins for Active Loudspeakers. Software source code for digital signal processing, designed for researchers studying optimal radiation patterns for loudspeakers in small rooms. rtaylor.sites.tru.ca/?p=123
- May 2013 Loudspeaker Placement in Small Rooms. Analyzsis the geometry of sound reflections in small rooms and the implications for optimal loudspeaker placement. rtaylor.sites.tru.ca/?p=86
- Feb 2013 Room Mode Correction with Ecasound. Software source code for suppression of resonant acoustic modes in small rooms. rtaylor.sites.tru.ca/?p=15
- Feb 2013 Aligning Loudspeaker Drivers with Delays: Simulations. Simulations of the use of digital delays for phase and time alignment of loudspeaker drivers. rtaylor.sites.tru.ca/?p=6
- Aug 2011 S. Richard Taylor and Stacey Lamont. Computer Optimization of Job Rotation Schedules in Laboratory Accession at Royal Inland Hospital. Technical Report.

Presentations

Conferences

- 2016 "Assessing Our Calculus Readiness Test". Invited talk, Sharing Math conference, Columbia College, Vancouver.
- 2007 "Approximating Chaotic Saddles for Delay Differential Equations". Annual meeting of the Canadian Applied and Industrial Mathematics Society, Banff AB.

Other

- 2014 "Doodles and Fractal Geometry". Keynote Lecture, BC High Schools Math Contest, Thompson Rivers University.
- 2011 "Density Evolution for Delay Differential Equations". Invited talk, Mathematical Biology research group, UBC Okanagan.
- 2011 "Density Evolution for Delay Differential Equations". Mathematics & Statistics departmental seminar, Thompson Rivers University.
- 2010 "Mathematics and Music: Timbre and Consonance". Mathematics & Statistics departmental seminar, Thompson Rivers University.
- 2008 "Approximating Chaotic Saddles for Delay Differential Equations". Mathematics & Statistics departmental seminar, Thompson Rivers University.
- 2007 "The Calculus of variations: All you need to know in one easy lesson". Mathematics & Statistics departmental seminar, Thompson Rivers University.

- 2006 “The Interplanetary superhighway: Chaotic transport through the solar system”. Mathematics & Statistics departmental seminar, Thompson Rivers University.
- 2006 “The Interplanetary superhighway: Chaotic transport through the solar system”. Keynote Lecture, BC High Schools Math Contest, Northwest Community College, Prince Rupert.

Student Research Supervision

Graduate Students

- 2015–16 **M.Sc. thesis supervisory committee**, *Thompson Rivers University, Canada*.
Stephanie Winton, “Assessing the relationship between roads and Northern Pacific Rattlesnakes (*Crotalus oreganus*) in South Okanagan, BC.”
- 2015 **Ph.D. thesis external referee**, *Alexandria University, Egypt*.
Eman Rashad Elwan Mohamed, “Numerical optimization methods for output feedback pole assignment.”

Undergraduate Students

- 2016 **Project supervisor**, *Thompson Rivers University, Canada*.
Kurtis Manke, “Dipole antenna arrays with constant directivity”. Summer research project funded by excess funds from a previous grant.
- 2015 **B.Sc. thesis examining committee**, *Thompson Rivers University, Canada*.
Benjamin Moore, “Mixing and recolouring problems.”
- 2013 **B.Sc. thesis supervisor**, *Thompson Rivers University, Canada*.
Natascha Hedrich, “Phase correction with allpass filters and the Remez algorithm.”
- 2013 **B.Sc. thesis examining committee**, *Thompson Rivers University, Canada*.
Aaron Martens, “The Prime Number Theorem.”
- 2013 **Project supervisor**, *Thompson Rivers University, Canada*.
Shane Sangha, “Inverse kinematics for development of a welding and plasma cutting industrial robot.” Applied research for axiMech, a Kamloops manufacturing company.
- 2012 **Project supervisor**, *Thompson Rivers University, Canada*.
Aaron Plahn, “Regularization and chaos in the classical three-body problem.” Research term funded by a TRU CUEF Undergraduate Student Research Experience Award.
- 2010 **B.Sc. thesis supervisor**, *Thompson Rivers University, Canada*.
Susan Kinniburgh, “Ergodic theory.”
- 2010 **B.Sc. thesis examining committee**, *Thompson Rivers University, Canada..*
Laura Teshima, “Swarm optimization.”
- 2008 **Project supervisor**, *Thompson Rivers University, Canada..*
Stacey Lamont. Applied research funded by a contract with the Interior Health Authority. Computer-aided automation and optimization of job rotation scheduling for the laboratory at Royal Inland Hospital, and of tournament scheduling for the City of Revelstoke Parks & Recreation Dept.
- 2007 **B.Sc. thesis examining committee**, *Thompson Rivers University, Canada*.
Timothy Graves, “Quantum computing.”

- 2007 **B.Sc. thesis examining committee**, *Thompson Rivers University, Canada*.
Sam Bassett, “Graph recolouring.”
- 2007 **Project supervisor**, *Thompson Rivers University, Canada*.
Timothy Graves, “Dynamics and regularization of the classical three-body problem.” Research term funded by a TRU CUEF Undergraduate Student Research Experience Award.

Service and Leadership

External

- 2015-16 **BC High Schools Math Contest Organizing Committee**, *member*, helping to organize this province-wide event, as well as edit and typeset contest content.
- 2005-16 **BC High Schools Math Contest**, *volunteer*, helping to organize and host the final round of the contest held annually at TRU.
- 2005-16 **Math Outreach & Schools Liaison**, *volunteer*, regular school visits to provide math enrichment activities.

University Level

- 2012-16 **Articulation Working Group**, *Math. & Stats. rep.*
- 2012-16 **Research Computing and Technology Advisory Committee**, *Science rep.*

Faculty Level

- 2015-16 **Promotion Committee**, *member*, for a faculty member’s promotion to Senior Lecturer.
- 2015-16 **Graduate Program Committee, M.Sc. in Data Science**, *member*.
- 2014-16 **Engineering Program Advisory Committee**, *Math. & Stats. rep.*
- 2011-16 **Science Recruitment and Retention Committee**, *Math. & Stats. rep.*

Department Level

- 2012-16 **Curriculum Committee**, *Chair*, Dept. of Math. & Stats.
- 2014-16 **Program Coordinator & Advisor**, Dept. of Math. & Stats.
- 2005-15 **Math Help Centre Tutor**.

Consulting

- 2013 **Royal Inland Hospital**, *Renal Unit*.
Designed and manufactured of acoustical remediation for patient interview rooms.
- 2008 **Royal Inland Hospital**, *Laboratory Accession*, Brian Redford, HR Director.
Designed and implemented computer software that uses genetic and simulated annealing algorithms to resolve conflicts and optimize resource allocation in the job rotation schedule in the RIH laboratory.
- 2008 **City of Revelstoke**, *Parks & Recreation*, Alan Chell, Director.
Designed and implemented computer software that uses to resolve conflicts and optimize resource allocation in the game schedules for both the annual Big Bear soccer tournament and the Glacier Challenge slowpitch tournament.

- 2005 **Okanagan University College, Salmon Arm Campus**, Lynda Wilson, Principal.
Designed and implemented computer software to resolve conflicts and optimize resource allocation in the course schedule for the 2005-06 academic year.
- 2004 **Golder Associates Engineering, Kamloops office**, Matthew Thibeault PEng, Associate.
Developed formulas for analysis of soil cut geometry in a railway design.
- 2003–2004 **UBC Dept. of Mathematics**, Brian Seymour PhD, Professor.
Programmed a suite of Matlab scripts for computing solutions of boundary-value, eigenvalue and integral problems for acoustical modeling.
- 2003 **BC Ministry of Energy, Mines & Petroleum Resources**, JoAnne Nelson MSc, PGeo, Senior Mineral Geologist.
Developed an Excel spreadsheet template for statistical analysis of rock dating.

Academic Awards

- 2001–2003 **NSERC Post-Graduate Scholarship B**, U. Waterloo, \$38,200.
- 1999–2001 **NSERC Post-Graduate Scholarship A**, U. Waterloo, \$34,600.
- 1999–2003 **Mathematics Faculty Graduate Scholarships**, U. Waterloo, \$12,000.
- 2000-2001 **University of Waterloo Graduate Scholarship**, U. Waterloo, \$1,000.
- 1998-1999 **University of British Columbia Graduate Fellowship**, UBC, \$15,000.
- 1997-1998 **Walter D. Frith Scholarship**, UBC, \$900.
- 1993-1995 **President’s Entrance Scholarship**, UBC, \$4,800.
- 1993-1995 **Canada Science Scholarship**, UBC, \$5,000.

Research Interests

- Dynamical systems, chaos, and ergodic theory; delay differential equations.
- Acoustics and digital signal processing; applications to sound reproduction.
- Numerical analysis, scientific computing, modeling and simulation.
- Scheduling automation and optimization.

Technical/Computer Skills

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|--------------|-------------------|-----------------------------------|
| ○ C/C++ | ○ Maple | ○ Linux/Unix |
| ○ Fortran | ○ Mathematica | ○ L ^A T _E X |
| ○ HTML | ○ Matlab / Octave | ○ Tablix (scheduling) |
| ○ XML / XSLT | ○ R | ○ AcouSTO (acoustics) |
| ○ Perl | ○ gmsH (meshing) | |

Performing Arts

- Oct 2015 **Kamloops Museum, Western Canada Theatre at 40**, with Sheanna James.
Played piano accompaniment for a singer, as musical entertainment for the exhibit opening.

- April 2015 **BC Psychogeriatric Association**, *Annual Conference*, with Toby Wendland.
Played accordion with guitar accompaniment: a set of chansons musette (french café songs) as musical entertainment during the conference reception.
- Nov 2013/14 **Western Canada Theatre**, *High-Wire Festival*, Daryl Cloran, artistic director.
Played piano in a jazz ensemble: a set of jazz standards as the intro/outro of a theatre production. 3 shows each year.
- Oct 2012 **BC Living Arts**, *Webley Awaits*, Alan Corbishley, writer/director.
Played accordion and harmonica in the stage band of a musical theatre production showcasing the music of Tom Waits and Jason Webley. 4 shows.
- Dec 2011 **Kamloops Symphony Orchestra**, *Annual Fundraiser Banquet*.
Played accordion with guitar accompaniment as musical entertainment during dinner.
- April 2010 **BC Living Arts**, *Opera'licious*, with Toby Wendland.
Played accordion with guitar accompaniment as musical entertainment during dinner.