

Curriculum Vitae

Paul Macklin, Ph.D.

Center for Applied Molecular Medicine (CAMM)
Keck School of Medicine
University of Southern California
Los Angeles, CA USA

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www: <http://MathCancer.org>

EDUCATION:

- Sept. 2003 to June 2007 **Ph.D. in Computational and Applied Mathematics**
University of California, Irvine (UCI)
Thesis Topic: Ghost fluid / level set methods and their application to computational oncology
Advisor: Professor John Lowengrub
Kovalevsky Outstanding Ph.D. Thesis Award
- June 2000 to Sept. 2003 **M.S. in Industrial and Applied Mathematics**
University of Minnesota, Twin Cities
Thesis Topic: Nonlinear simulation of tumor growth and chemotherapy
Advisor: Professor John Lowengrub
- June 1999 to May 2000 Graduate study in applied mathematics
University of Nebraska, Lincoln
- Aug. 1995 to May 1999 **B.A. in Mathematics and German**
University of Nebraska, Lincoln
Minors: Physics and Economics
Thesis Topic: Simulation of contaminant transport in aquifers
Advisors: Professors J. David Logan and Steven Cohn
highest distinction (summa cum laude), honors program

RECENT EXPERIENCE:

- May 2012 to Present Co-Founder and Co-Director
Consortium for Integrative Computational Oncology (CICO)
University of Southern California, Los Angeles
- Aug. 2011 to present Assistant Professor of Research Medicine
Center for Applied Molecular Medicine (CAMM)
Keck School of Medicine
University of Southern California, Los Angeles
- Feb. 2010 to Aug. 2011 Lecturer (permanent staff — UK version of tenure-track)
Division of Mathematics
University of Dundee, Scotland
- Aug. 2007 to Feb. 2010 Assistant Professor of Health Informatics (non-tenure track)
School of Biomedical Informatics (SBMI)
(Formerly School of Health Information Sciences)
University of Texas Health Science Center, Houston (UTH)

July 2007	Postdoctoral Research Assistant Department of Mathematics University of California, Irvine
Sept. 2003 to June 2007	Graduate Teaching Assistant and Research Fellow Department of Mathematics University of California, Irvine
June 2000 to Sept. 2003	NSF Graduate Research Fellow, Research and Teaching Assistant Department of Mathematics University of Minnesota, Twin Cities
June 2000 to Sept. 2001	Intern, fiber optics research group 3M, Saint Paul, MN
July 1999 to May 2000	NSF Graduate Research Fellow, Teaching Assistant Department of Mathematics and Statistics University of Nebraska, Lincoln

SELECTED RESEARCH INTERESTS:

Integrative computational oncology: I work with multidisciplinary teams of modelers, clinicians, and experimentalists to develop simulation platforms that integrate clinical data, theoretical biology, and state-of-the-art *in vitro* and bioengineered tissues to simulate cancer and predict progression and therapy response. Recent applications include breast, prostate, and metastatic colon cancer.

Patient-calibrated models of breast cancer: I am leading a multidisciplinary team to develop agent-based models of breast cancer. The models are calibrated to a patient's pathology, combined with *in vitro* measurements of cell properties, used to generate clinical predictions, and validated against the patient's pathology and radiology. In an effort to create next-generation quantitative clinical planning tools, we aim to (1) better predict the relationship between pre-operative mammographic and post-operative pathologic measurements of ductal carcinoma in situ (DCIS), and (2) to predict and control progression from DCIS to invasive ductal carcinoma (IDC), on a patient-by-patient basis.

Mechanistic agent-based cell model: Distinct cells objects move under the balance of mechanical forces. Key molecular and cellular biology are implemented through optional "sub-models" that regulate cell properties (e.g., volume, receptor density) over time. Cell phenotype is determined by microenvironment- and proteomic/genomic-dependent stochastic processes.

Advanced cell agent sub-models: The cell cycle, apoptosis, necrosis, and calcification models are being updated to include water transport, solid synthesis and degradation, and calcium phosphate crystal formation, as informed by ongoing *in vitro* time course measurements on multiple cell lines.

Tissue biomechanics and transport: High-accuracy numerical methods are used to simulate drug and substrate transport in tissues, tissue biomechanics, and membrane expansion/deformation.

Multiscale models: By combining molecular-, cellular-, and tissue-scale models with consistent hybrid techniques, we can investigate whole-tumor response to the heterogeneous molecular landscape.

Open source software and open model/data standards: Open model/data sharing standards foster collaboration by improving model interoperability. The release of sophisticated, open source simulation software could accelerate scientific advance and improve scientific transparency.

JOURNAL PUBLICATIONS:

1. **P. Macklin**, M.E. Edgerton, A.M. Thompson, and V. Cristini, *Patient-calibrated agent-based modelling of ductal carcinoma in situ (DCIS): From microscopic measurements to macroscopic predictions of clinical progression*, J. Theor. Biol., 301, (2012), pp. 122-40.
URL: <http://dx.doi.org/10.1016/j.jtbi.2012.02.002>
2. H. Hatzikirou, A. Chauviere, A.L. Bauer, A. Leier, M.T. Lewis, **P. Macklin**, T. Marquez-Lago, E. Bearer, and V. Cristini. *Integrative Physical Oncology*, WIREs Syst. Biol. Med., 4 (1), (2012), pp. 1-14. **invited author: V. Cristini** **URL:** <http://dx.doi.org/10.1002/wsbm.158>
3. M.E. Edgerton, Y.-L. Chuang, **P. Macklin**, W. Yang, E.L. Bearer, and V. Cristini. *A novel, patient-specific mathematical pathology approach for assessment of surgical volume: Application to ductal carcinoma in situ of the breast*, Anal. Cell. Pathol., 34 (5), (2011), pp. 247-63.
URL: <http://dx.doi.org/10.3233/ACP-2011-0019>
4. T.S. Deisboeck, Z. Wang, **P. Macklin**, and V. Cristini, *Multiscale Cancer Modeling*, Annu. Rev. Biomed. Eng., 13, (2011), pp. 127-55. **invited author: T.S. Deisboeck**
URL: <http://dx.doi.org/10.1146/ANNUREV-BIOENG-071910-124729>
5. J.S. Lowengrub, H.B. Frieboes, F. Jin, Y.-L. Chuang, X. Li, **P. Macklin**, S.M. Wise, and V. Cristini, *Nonlinear modeling of cancer: bridging the gap between cells and tumors*, Nonlinearity, 23 (1), (2010), pp. R1-R91. **invited author: J.S. Lowengrub**
URL: <http://dx.doi.org/10.1088/0951-7715/23/1/R01>
6. **P. Macklin**, S. McDougall, A.R.A. Anderson, M.A.J. Chaplain, V. Cristini, and J.S. Lowengrub, *Multiscale modelling and nonlinear simulation of vascular tumour growth*, J. Math. Biol., 58 (4-5), (2009), pp. 765-98. **URL:** <http://dx.doi.org/10.1007/s00285-008-0216-9>
7. **P. Macklin** and J.S. Lowengrub, *A New Ghost Cell/Level Set Method for Moving Boundary Problems: Application to Tumor Growth*, J. Sci. Comput., 35 (2-3), (2008), pp. 266-99.
URL: <http://dx.doi.org/10.1007/s10915-008-9190-z>
8. H.B. Frieboes, J.S. Lowengrub, S. Wise, X. Zheng, **P. Macklin**, E.L. Bearer, and V. Cristini, *Computer Simulation of Glioma Growth and Morphology*, NeuroImage, 37 (S1), (2007), pp. S59-S70. **URL:** <http://dx.doi.org/10.1016/j.neuroimage.2007.03.008>
9. **P. Macklin** and J.S. Lowengrub, *Nonlinear simulation of the effect of microenvironment on tumor growth*, J. Theor. Biol., 245 (4) (2007), pp. 677-704.
URL: <http://dx.doi.org/10.1016/j.jtbi.2006.12.004>
10. **P. Macklin** and J.S. Lowengrub, *An improved geometry-aware curvature discretization for level set methods: application to tumor growth*, J. Comput. Phys., 215 (2) (2006), pp. 392-401.
URL: <http://dx.doi.org/10.1016/j.jcp.2005.11.016>
11. **P. Macklin** and J.S. Lowengrub, *Evolving interfaces via gradients of geometry-dependent interior Poisson problems: application to tumor growth*, J. Comput. Phys., 203 (1) (2005), pp. 191-220.
URL: <http://dx.doi.org/10.1016/j.jcp.2004.08.010>

JOURNAL PUBLICATIONS IN REVIEW:

1. G. D'Antonio, **P. Macklin** and L. Preziosi, *An agent-based model for elasto-plastic mechanical interactions between cells, basement membrane, and extracellular matrix*, Math. Biosci. Eng. (2012) (in review)
URL: http://www.mathcancer.org/publications/Dantonio_et_al_2012_cell_BM_ECM.pdf

JOURNAL PUBLICATIONS IN PREPARATION:

1. S. Mumenthaler and **P. Macklin**, *Time course volume and water fraction measurements in cycling and apoptotic breast cancer cell lines*, in preparation.
2. G. D'Antonio and **P. Macklin**, *A multiscale hybrid discrete-continuum model of matrix metallo-proteinase transport and basement membrane-extracellular matrix degradation*, in preparation.
3. **P. Macklin** and H.B. Frieboes, *Stochastic and Agent-Based Modeling Rationale for Hill-type Pharmacodynamic Response*, in preparation.
4. **P. Macklin**, A. Evans, L. Jordan, C. Purdie, and A. Thompson, *Quantitative study of Ductal Carcinoma in Situ Progression, Necrosis, and Calcification: Application to Interpretation of Mammography*, in preparation.

PEER-REVIEWED ABSTRACTS AND OTHER PUBLICATIONS:

1. **P. Macklin**, S. Mumenthaler, L.B. Jordan, C.A. Purdie, A.J. Evans, D.B. Agus, and A.M. Thompson, *Impact of Improved Intracellular Fluid and Calcification Dynamics on Patient-Calibrated Simulation of DCIS and Comedonecrosis*, 2012 SIAM Conference on the Life Sciences, MS18: Mathematical Methods in Oncology: from Prognostic Screening to Therapeutic Treatment - Part I of II. (2012, accepted)
2. **P. Macklin**, S. Mumenthaler, L.B. Jordan, C.A. Purdie, A.J. Evans, D.B. Agus, and A.M. Thompson, *Integration of Pathology, Radiology, and in vitro Data in Patient-Calibrated Cancer Simulations: Recent Advances and Future Outlook for Ductal Carcinoma In Situ (DCIS)*, Annual Meeting of the Society for Mathematical Biology (SMB), Mini-symposium 12: Bridging mathematical models and experiments. (2012, accepted)
3. **P. Macklin**, M.E. Edgerton, A. Thompson, and V. Cristini, *An illustration of patient-specific cancer modeling: from microscopic data to macroscopic, quantitative predictions*, 8th European Conference on Mathematical and Theoretical Biology / Annual Meeting of the Society for Mathematical Biology (ECMTB/SMB), Mini-symposium 9: Multiscale modeling of biological systems: From Physical Tools to Applications in Tumor Growth Modeling-I. (2011)
4. **P. Macklin**, M.E. Edgerton, A. Thompson, and V. Cristini, *Mechanistic cell-scale modelling of ductal carcinoma in situ (DCIS): impact of cell biomechanics*, 8th European Conference on Mathematical and Theoretical Biology / Annual Meeting of the Society for Mathematical Biology (ECMTB/SMB), Mini-symposium 74: Mechanical Models of Movement and Growth of Cells and Tissues-I. (2011)

5. **P. Macklin**, M.E. Edgerton, A.J. Evans, C.A. Purdie, L.B. Jordan, A.M. Thompson, and V. Cristini, *Patient-calibrated modeling of ductal carcinoma in situ (DCIS): From microscopic measurements to macroscopic predictions of clinical progression*, Second Annual National Cancer Institute Physical Sciences-Oncology Centers (NCI PS-OCs) Network Investigators' Meeting, "Determining if there is and/or defining a fundamental equation of cancer" session. (2011)
6. M.E. Edgerton, Y.-L. Chuang, **P. Macklin**, S. Sanga, J. Kim, G. Tomaiuolo, W. Yang, A.D. Broom, K.-A. Do, and V. Cristini, *Using Mathematical Models to Understand the Time Dependence of the Growth of Ductal Carcinoma In Situ*, *Canc. Res.* 69 (Suppl. 2): Abstract 1165 (2009).
7. M.E. Edgerton ME, Y.-L. Chuang, **P. Macklin**, J. Kim, G. Tomaiuolo, A.D. Broom, S. Sanga, and V. Cristini, *Simulation of growth of DCIS parameterized from IHC*, *Modern Path.* 22 (Suppl. 1): 37A - 38A (2009).
8. A. Kumar, Y.-L. Chuang, **P. Macklin**, S. Sanga, J. Kim, G. Tomaiuolo, V. Cristini, and M.E. Edgerton, *A model to predict the proliferation index of ductal carcinoma in situ*, AACR Meeting Abstracts Online 2009: Abstract 2444 (2009).

BOOKS AND BOOK CHAPTERS:

1. **P. Macklin**, Y. Chen, and J.S. Lowengrub, "Impact of necrotic tissue biomechanics on tumor progression: insight from multiscale modeling." In A. Gefen (editor), *Multiscale Computer Modeling in Biomechanics and Biomedical Engineering*, Springer, 2012. (in preparation)
invited author: P. Macklin
2. **P. Macklin**, M.E. Edgerton, and V. Cristini, "Agent-based cell modeling: application to breast cancer." In V. Cristini and J.S. Lowengrub, *Multiscale Modeling of Cancer: An Integrated Experimental and Mathematical Modeling Approach*, Cambridge University Press, chap. 10, pp. 206–234, Cambridge, United Kingdom, 2010. ISBN: 978-0-521-88442-6. **invited author: P. Macklin**
3. **P. Macklin**, M.E. Edgerton, J.S. Lowengrub, and V. Cristini, "Discrete cell modeling." In V. Cristini and J.S. Lowengrub, *Multiscale Modeling of Cancer: An Integrated Experimental and Mathematical Modeling Approach*, Cambridge University Press, chap. 6, pp. 88–122, Cambridge, United Kingdom, 2010. ISBN: 978-0-521-88442-6. **invited author: P. Macklin**
4. **P. Macklin**, "Biological background" In V. Cristini and J.S. Lowengrub, *Multiscale Modeling of Cancer: An Integrated Experimental and Mathematical Modeling Approach*, Cambridge University Press, chap. 2, pp. 8-23, Cambridge, United Kingdom, 2010. ISBN: 978-0-521-88442-6.
invited author: P. Macklin
5. **P. Macklin**, J. Kim, G. Tomaiuolo, M.E. Edgerton, and V. Cristini, "Agent-Based Modeling of Ductal Carcinoma in Situ: Application to Patient-Specific Breast Cancer Modeling." In T. Pham (editor) *Computational Biology: Issues and Applications in Oncology*, chap. 4, pp. 77-112. Springer, New York, NY, 2009. ISBN: 978-1-4419-0810-0. **invited author: P. Macklin**
6. V. Cristini, H.B. Frieboes, X. Li, J.S. Lowengrub, **P. Macklin**, S. Sanga, S.M. Wise, and X. Zheng, "Nonlinear modeling and simulation of tumor growth." In N. Bellomo, M.A.J. Chaplain, and E. de Angelis (editors) *Selected topics in cancer modeling: Genesis, evolution, immune competition, and therapy. Modelling and Simulation in Science, Engineering, and Technology*, chap. 6, pp. 113-82. Birkhäuser, Boston, 2008. ISBN 978-0-8176-4712-4. **invited author: V. Cristini**

DISSERTATION AND THESES:

1. P. Macklin, *Toward Computational Oncology: Nonlinear Simulation of Centimeter-Scale Tumor Growth in Complex, Heterogeneous Tissues*, Ph.D. Dissertation, University of California-Irvine Department of Mathematics (2007).
Download: http://www.MathCancer.org/publications/Macklin_PhD_Dissertation_2007.pdf
2. P. Macklin, *Nonlinear Simulation of Tumor Growth and Chemotherapy*, M.S. Thesis, University of Minnesota School of Mathematics (2003).
Download: http://www.MathCancer.org/publications/Macklin_MS_Thesis_2003.pdf
3. P. Macklin, *Analysis of an Explicit Finite Difference Scheme for a Groundwater Flow Problem*, Undergraduate Honors Thesis, University of Nebraska-Lincoln Honors Program (1999).

GRANTS:

- 2012 Co-PI (5% salary) for *Establishing The Center for Integrative Computational Oncology (CICO) at VSOE/KSOM*. (Co-PIs P. Macklin and P. Newton) USC James H. Zumberge Research And Innovation Fund, Multi-School Interdisciplinary Award. Sept. 2012–Sept. 2013 (total: \$50,000)
- 2012 PI (0% salary; support for 2 undergraduates) for *Validating a patient-calibrated breast cancer simulator*. USC Undergraduate Research Associates Program (URAP). July 2012–July 2013 (\$6600)
- 2008 Co-I (100% salary) for “*Virtual Cancer: Reducing cancer recurrence and progression. New paradigms in cancer diagnostics and treatment through computational modeling of biological systems*.” (PI Vittorio Cristini) Cullen Trust for Health Care. 1 Aug. 2008–28 Feb. 2010 (total: \$1.5 million)
- 2009 Co-I (10% salary) for *Multi-Scale Complex Systems Transdisciplinary Analysis Of Response To Therapy* (PI W. Daniel Hillis) NIH:NCI. 28 Sep. 2009–28 Feb. 2010 (center total: \$3,112,763 UT: \$683,768)
- 2009 Co-I (30% salary) for *Center for Transport Oncophysics* (PI Mauro Ferrari) NIH:NCI. 28 Sep. 2009–28 Feb. 2010 (center total: \$2,394,313 UT: \$553,740)
- 2009 Co-I (17% salary) fo *Center for Systematic Modeling of Cancer Development* (PI Stephen T.C. Wong) NIH:NCI. 1 May 2010–28 Feb. 2010 (center total: \$2,296,450 UT: \$553,740)
- 1999 PI/Fellow (stipend and educational costs) for *National Science Foundation Graduate Research Fellowship Program* (NSF GFRP), 1999–2000; 2001–2003. (total: \$76,500)

SELECTED HONORS:

- 2009 UTH SBMI John P. McGovern Award for Outstanding Teaching
- 2007 UCI Department of Mathematics Kovalevsky Outstanding Ph.D. Thesis Award
- 2007 UCI School of Physical Sciences “Outstanding Contributions to the Dept. of Mathematics” Award
- 2007 UCI Department of Mathematics Connelly Award (for an excellent teaching and research record)
- 2007 UCI Mathematics Department Kovalevsky Outstanding Ph.D. Thesis Award
- 2007 Graduate Assistance in Areas of National Need (GAANN) Fellowship
- 2007 University of California, Irvine Department of Mathematics Dissertation Fellowship

- 2006 University of California, Irvine Department of Mathematics Fellowship
- 2003 University of California, Irvine Department of Mathematics Research Fellowship
- 1999 NSF Graduate Research Fellowship
- 1999 Inducted Phi Beta Kappa
- 1998 Barry M. Goldwater Scholarship

SERVICE AND OPEN SOURCE WORK:

1. Developed and Maintained the MultiCellXML project, an open XML-based data format for multi cell agent-based simulations, with open source code samples
<http://multicellxml.sourceforge.net> (2011–present)
2. Reviewer for *Journal of Theoretical Biology*, *Biophysical Journal*, *Cell Proliferation*, *Biomechanics and Modeling in Mechanobiology*, *Journal of Computational Physics*, *Journal of Biological Dynamics*, and *Bulletin of Mathematical Biology* (2007–present)
3. Developed and Maintained EasyBMP, an open source, cross-platform C++ bitmap (BMP) image library for industrial, educational, and academic use - over 71,500 downloads since inception
<http://easybmp.sourceforge.net> (2005–present)
4. Developed and Maintained Easy BMP to AVI Movie Creator, an open source, cross-platform tool for converting images to movies, primarily for scientific visualization - over 24,000 downloads since inception
<http://easybmptoavi.sourceforge.net> (2006–present)
5. Founded and Organized the UCI Mathematics Graduate Student Colloquium (MGSC)
<http://math.uci.edu/~mgsc/> (2006–2007)

INVITED WORKING GROUPS AND STANDARDS COMMITTEES:

- 2011 SIGNET (Cell Signaling Network) Multicellular Modelling Workshop – for development of methods for exchanging and curating multicellular models – University of Nottingham, Nottingham, UK (talk cancelled)
- 2011 Cell Behavior Ontology Workshop – for development of the Cell Biology Ontology (CBO) and the Cell Biology Modeling Specification Language (CBMSL) – Biocomplexity Institute, Indiana University, Bloomington, IN

TRAINEES: M.S. / MSc level and above:

Angela Lee	Ph.D. in Aerospace and Mechanical Engineering - University of Southern California - in progress - committee member
Jeremy Mason	Ph.D. in Aerospace and Mechanical Engineering - University of Southern California - in progress - committee member
Lu Peng	Ph.D. in Mathematics - University of Dundee, Scotland - in progress - dissertation co-supervisor
Lydia Hill	Ph.D. in Mathematics - University of Dundee, Scotland - 2011 - internal examiner
Sandeep Sanga	Ph.D. in Biomedical Engineering - University of Texas at Austin - 2009 - committee member
Jahun Kim	Ph.D. student - University of Texas Health Science Center - committee member

Giovanna Tomaiuolo **Ph.D.** in Biomedical Engineering - University of Naples, Italy - 2008 - summer mentor

TRAINEES: Selected undergraduates:

Alice Hyun **Undergraduate intern** (Viterbi School of Engineering) for patient-calibrated DCIS project, University of Southern California, June 2012-present (funded by URAP program) - supervisor/mentor

Margy Gunnar **Undergraduate intern** (Dornsife College of Letters, Arts & Sciences) for patient-calibrated DCIS project, University of Southern California, Sep. 2012-present (funded by URAP program) - supervisor/mentor

Jasmine McAllister **Undergraduate researcher** (Dornsife College of Letters, Arts & Sciences) in breast cancer pathology modeling project, University of Southern California, May 2012-present - mentor

Gregor Omelasz **BSc senior dissertation** in Mathematics - University of Dundee, Scotland - 2011 - undergraduate dissertation supervisor

Lisa Mordente **BSc senior dissertation** in Mathematics - University of Dundee, Scotland - 2011 - undergraduate dissertation supervisor

Jasmine McAllister **Undergraduate researcher** (Dornsife College of Letters, Arts & Sciences) in breast cancer pathology modeling project, University of Southern California, May 2012-present

Deepa Raghunathan **Summer intern** - MD Anderson Cancer Center - 2008 - summer mentor
2008 STEP-UP Clinical and Research Internship Award for Research Excellence

RECENT TEACHING:

University of Dundee (2010–2011)

Fall 2010 MA51002: Computational Modelling and Programming - Instructor
Note: Developed new course including numerical simulation of random variables, stochastic processes, stochastic differential equations, ODEs, BVPs, PDEs, and image processing

Fall 2010 MA40001: PTS and Project Work - Co-Instructor
Note: Course emphasises student presentation skills in mathematical biology

Spring 2011 MA22003: Statistics and Discrete Mathematics - Co-Instructor

University of Texas Health Science Center (2007–2009)

Fall 2007 HI 5001: Mathematical Methods for Health Informatics - Assisting Instructor

Spring 2008 HI 5001: Numerical Methods for Health Information Sciences - Assisting Instructor
Note: Co-developed new Octave-based numerics curriculum

Summer 2008 HI 5001: Mathematical Modeling of Biological Systems and Disease - Guest Lecturer

Spring 2009 HI 5311: Foundations of Health Information Sciences II (Mathematical Modeling in Biomedicine) - Co-Instructor
Note: Co-developed new multidisciplinary team-based curriculum
Note: Recognised for outstanding teaching for new curriculum

University of California-Irvine (2004–2007)

Fall 2004 Math 2B: Single Variable Calculus - Teaching Assistant

Winter 2005 Math 3D: Elementary Differential Equations - Teaching Assistant

Spring 2005 Math 3D: Elementary Differential Equations - Teaching Assistant

Spring 2005 Math 107: Numerical Differential Equations - Teaching Assistant

Fall 2005 Math 2E: Multivariable Calculus - Teaching Assistant

Winter 2006 Math 3D: Elementary Differential Equations - Teaching Assistant

INVITED TALKS:

- 2012 “(Agent-based) models to integrate and simulate complex cancer data: A conversation starter”, Joint ASU/USC Meeting on Complex Adaptive Systems (CAS): Leveraging Advances in the CAS Sciences to Understand and Control Complex Diseases such as Cancer, Arizona State University (ASU) Complex Adaptive Systems Initiative (CASI) and University of Southern California Physical Sciences-Oncology Center (USC-PSOC), Scottsdale, Arizona
- 2012 “The Emerging Role of Patient-Calibrated Computational Modeling in Cancer Research: A Case Study in Ductal Carcinoma in Situ (DCIS)”, University of Southern California Physical Sciences-Oncology Center (USC-PSOC) Seminar Series, University of Southern California, Los Angeles
- 2012 “Patient-calibrated simulation of ductal carcinoma in situ (DCIS): a small step from the blackboard towards the bedside”, Center for Applied Mathematical Sciences, University of Southern California, Los Angeles
- 2011 “Patient-calibrated simulation of ductal carcinoma in situ (DCIS)”, Aerospace and Mechanical Engineering (Newton Research Group), University of Southern California, Los Angeles
- 2011 “Patient-calibrated simulation of ductal carcinoma in situ (DCIS): a small step from the blackboard towards the bedside”, Applied and Computational Mathematics Seminar, University of California, Irvine
- 2011 “Blackboard to Bedside in DCIS: Advancing mathematical models towards patient-tailored clinical application; a physics-based approach to generating new biological and clinical hypotheses”, University of Southern California Physical Sciences-Oncology Center (USC-PSOC) Short Course on Multidisciplinary Cancer Modeling, Los Angeles
- 2011 “Patient-calibrated agent-based cancer modeling: emergent properties, clinical significance, and open problems”, Computer Science Dept. (TEAMCORE / Tambe Research Group), University of Southern California, Los Angeles
- 2011 “*An illustration of patient-specific cancer modeling: from microscopic data to macroscopic, quantitative predictions*”, 8th European Conference on Mathematical and Theoretical Biology / Annual Meeting of the Society for Mathematical Biology (ECMTB/SMB), Mini-symposium 9: Multiscale modeling of biological systems: From Physical Tools to Applications in Tumor Growth Modeling–I, Kraków, Poland.
- 2011 “*Mechanistic cell-scale modelling of ductal carcinoma in situ (DCIS): impact of cell biomechanics*”, 8th European Conference on Mathematical and Theoretical Biology / Annual Meeting of the Society for Mathematical Biology (ECMTB/SMB), Mini-symposium 74: Mechanical Models of Movement and Growth of Cells and Tissues–I, Kraków, Poland.
- 2011 “*Patient-Calibrated Cancer Modeling: Current progress, and next steps to model-augmented clinical planning*”, Center for Applied Molecular Medicine, University of Southern California
- 2011 “*Agent-based modelling of ductal carcinoma in situ (DCIS): patient-calibrated simulation results*”, College of Life Sciences (Nathke Research Group), University of Dundee, UK

- 2011 “*Agent-Based Modelling of Ductal Carcinoma in Situ (DCIS)*”, Cell Behavior Ontology Workshop IV, Biocomplexity Institute, Indiana University, Bloomington
- 2010 “*Agent-based modelling of ductal carcinoma in situ (DCIS): patient-calibrated simulation results*”, Computational Mathematics and Mathematical Biology Seminar, Department of Mathematics, Heriot-Watt University, Edinburgh, United Kingdom
- 2010 “*Agent-based cancer modelling: patient calibration and simulation results*”, Mathematics Seminar, Department of Computing Science and Mathematics, University of Stirling, United Kingdom
- 2010 “*Agent-Based Cancer Modelling: Numerical Method and Simulation Results*”, Mathematical Modelling of Cancer Growth and Treatment Summer School and Workshop, University of Dundee, United Kingdom (invited lecturer)
- 2010 “*Agent-Based Cancer Modelling: Parameter estimation and patient-specific calibration*”, Mathematical Modelling of Cancer Growth and Treatment Summer School and Workshop, University of Dundee, United Kingdom (invited lecturer)
- 2010 “*An agent-based cell model; application to DCIS*”, Mathematical Modelling of Cancer Growth and Treatment Summer School and Workshop, University of Dundee, United Kingdom (invited lecturer)
- 2010 “*Cancer Biology for Modellers*”, Mathematical Modelling of Cancer Growth and Treatment Summer School and Workshop, University of Dundee, United Kingdom (invited lecturer)
- 2010 “*Application of an Agent-Based Cell Model to Ductal Carcinoma in Situ, with Patient-Specific Calibration*”, The 8th AIMS Conference on Dynamical Systems, Differential Equations and Applications, Special Session 39: Mathematical Cancer Modelling, Dresden University of Technology, Germany (invitation declined)
- 2009 “*Towards Patient-Tailored, Predictive Cancer Modeling: Discrete and Continuum Multiscale Modeling and Early Results*”, Division of Mathematics, Dundee University
- 2009 “*Clinical-Mathematical Collaboration on Patient-Specific Modeling of Breast Cancer*”, RTG Workshop, Department of Mathematics, University of Utah, Salt Lake City (invitation declined)
- 2009 State of the Art in Computational Modelling of Cancer Minisymposium, SIAM Conference on Computational Science and Engineering CSE09, Miami, FL (invitation declined)
- 2008 “*Patient-Calibrated Multiscale Modeling of Ductal Carcinoma in Situ (DCIS)*”, Institute of Molecular Medicine (Ferarri Research Group), University of Texas Health Science Center, Houston
- 2008 Society of Mathematical Biology Annual Meeting, Montreal, Canada (invitation declined)
- 2008 “*Multiscale modeling and simulation of nonlinear vascular tumor growth*”, “Spatial Dynamics of Growth and Signaling” Symposium at the Conference on Mathematical Systems Biology, University of California, Irvine
- 2007 “*An (Incomplete) Progression of Mathematical Cancer Biology: From Early Continuum Modeling to Integrative Modeling*”, Mathematics Department Colloquium, University of Nebraska, Lincoln
- 2007 “*Nonlinear Simulation of Centimeter-Scale Tumor Growth into Complex Tissues*”, Mathematical Biology Seminar, University of Nebraska, Lincoln

- 2006 “*Computational Oncology: An Introduction to Cancer, with Simulations and Cool Results*”, Mathematics Graduate Student Colloquium, University of California, Irvine
- 1999 “*Finite differences and stability calculations in a filtration model*”, Workshop on Mathematical Methods in the Geosciences and Related Areas, University of Nebraska, Lincoln

CONTRIBUTED AND OTHER TALKS:

- 2011 Second Annual National Cancer Institute Physical Sciences-Oncology Centers (NCI PS-OCs) Network Investigators’ Meeting, La Jolla, CA
- 2007 Mathematical Modelling and Analysis of Cancer Invasion of Tissues Workshop, Dundee, United Kingdom
- 2005 The Modeling of Cancer Progression and Immunotherapy Workshop, American Institute of Mathematics (AIM), Palo Alto, CA
- 1999 Second Annual Regional Workshop in Mathematics and Statistics, University of Nebraska, Lincoln

TECHNICAL AND OTHER SKILLS:

Programming and Software skills:

- C++ and OpenGL/GLUT, with emphasis on scientific and high-performance computing
- Cross-platform/cross-architecture software development
- Open source/collaborative software development
- 2-D and 3-D scientific visualization
- MATLAB, Maple, Mathematica, COMSOL, and other mathematics software
- GIMP, Inkscape, and other open source graphic editing software
- W3C standards-compliant HTML and CSS web authoring
- PHP webpage authoring

Selected multidisciplinary skills:

- Experience in working directly with pathologists; basic interpretation and image processing of immunohistochemistry and histopathology images
- Experience in working directly with molecular and cellular biologists
- Experience in working directly with radiologists

Other skills:

- Building and maintaining computers
- Wired and wireless networking and security
- Fluent spoken and written German
- Public speaking skills

REFERENCES:

Available upon request