

# Chrysanthe Preza

## Contact Information

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## Education

*Washington University in St. Louis, St. Louis, MO:*

- Doctor of Science in Electrical Engineering, August 1998. Dissertation title: “Phase Estimation Using Rotational Diversity for Differential Interference Contrast Microscopy.” Advisor: Donald L. Snyder.
- Master of Science in Computer Science, August 1991. Focus on artificial intelligence, digital image processing, computer systems organization, and formal concepts in computer science.
- Master of Science in Electrical Engineering, August 1990. Thesis title: “A Regularized Linear-Reconstruction Method for Optical Sectioning Microscopy.” Advisor: Michael I. Miller.
- Bachelor of Science in Computer Science, cum laude, May 1987.
- Bachelor of Science in Electrical Engineering, cum laude, May 1987.

## Professional Experience

Conducting research in information-theoretic computational imaging applied to light microscopy and spectroscopy, and teaching a variety of electrical and computer engineering courses. Extensive experience in developing physics-based imaging models and processing methods for real imaging applications and implementation and testing of the methods via software engineering. Development and evaluation of optical systems and computational methods using the computational optical sensing and imaging (COSI) paradigm for different applications. Projects include: a) three-dimensional computational imaging microscopy for two different modalities: fluorescence, and differential interference contrast (DIC aka Nomarski); b) instrument development of an adaptive multimodal microscope system suitable for high-resolution thick sample imaging; c) development of sensors for material identification, detection and characterization; and d) development of an image-plane coded aperture terahertz imaging device for biological applications.

### a. Summary of Appointments

2017 – Present	<b>Professor and Chair</b> , The University of Memphis, Dept. of Electrical and Computer Engineering (primary) and Dept. of Biomedical Engineering
2010 – 2017	<b>Associate Professor</b> , The University of Memphis, Dept. of Electrical and Computer Engineering (primary) and Dept. of Biomedical Engineering
2006 – 2010	<b>Assistant Professor</b> , The University of Memphis, Dept. of Electrical and Computer Engineering (primary) and Dept. of Biomedical Engineering
2006 – Present	<b>Adjunct Faculty</b> , The University of Tennessee Health Science Center, Orthopedic Surgery and Biomedical Engineering

2000 - 2006	<b>Research Associate</b> , Washington University, Electronic Signals and Systems Research Laboratory, Dept. of Elect. and System Engineering
2000 - 2006	<b>Instructor</b> , Washington University, Dept. of Elect. and System Engineering
2003 - 2004	<b>Visiting Assistant Professor</b> , University of Cyprus, Dept. of Electrical and Computer Engineering
1998 - 2000	<b>Research Associate</b> , Washington University, Institute for Biomedical Computing (IBC)
1987 - 1998	<b>Research Assistant</b> , Washington University, IBC

## **b. Responsibilities and Activities**

### ***The University of Memphis, Memphis TN:***

Associate Professor, Department of Electrical and Computer Engineering (primary) and Dept. of Biomedical Engineering, Aug. 2010 – present; Assistant Professor, Department of Electrical and Computer Engineering (primary) and Dept. of Biomedical Engineering, Aug. 2006 – present.

- Establishment of the Computational Imaging Research Laboratory (CIRL), 2006.
- Conducting research in computational imaging applied to light microscopy. Investigations include: modeling for 3-D depth-variant and space-variant fluorescence microscopy imaging and model-based algorithm development for the correction of sample-induced aberrations; 3-D patterned illumination, point-spread function engineering and integrated algorithm development for improved system performance. Experimental validation on commercial modified microscope and instrument development on optical table.
- Model and algorithm development for quantitative DIC (Nomarski) microscopy. Experimental validation on commercial microscope modified with liquid crystal devices.
- Continuous development, maintenance and dissemination of the Computational Optical Sectioning Microscopy Open Source (COSMOS) platform-independent software package written in C++ with a VTK graphical user interface (<http://cirl.memphis.edu/cosmos>).
- Participation in completed collaborative projects with faculty (R. Piestun and C. Cogswell) at the University of Colorado, Boulder
- Involvement in collaborative and interdisciplinary research in bioimaging with Christopher M. Waters at the University of Tennessee Health Science Center (UTHSC) in Memphis.
- Involvement in collaborative and interdisciplinary research in biological investigations with collaborator Omar Skalli (Biological Sciences Dept. at the University of Memphis).
- Participated in a project for the development of an image-plane coded aperture terahertz imaging device for biological applications with Orges Furxhi and Eddie Jacobs.
- Participated in a project for the development of sensors for material identification, detection and characterization with S. T. Griffin (PI) and A. Robinson (co-PI).
- Participated in a project that studied Nyquist limited infrared detectors. The research team included E. Jacobs (PI), C. Harlford, A. Robinson, S. Chari and C. Preza.
- Participation in preparation and submission of external and internal grant proposals (see **Active, Pending, and Completed Research Support** listed below).
- Dissemination of research results through publications, conference presentations and invited seminars.
- Supervising and coordinating research activities of post-doctoral fellows, graduate and undergraduate students.
- Participation in the MemphiSTEM Undergraduate Research Program, 2010 – 2015.
- Teaching a variety of electrical and computer engineering courses. A list of courses is provided below under **Courses Taught**.

- Recruitment of talented graduate students.
- Recruitment of students from underrepresented groups to Electrical and Computer Engineering.
- Academic advising and mentoring of undergraduate and graduate students and post-doctoral fellows.
- Graduate Program Coordinator of the EECE Department: Aug 2013 – present.
- Associate Chair of the EECE Department: Jan 2016 – present.
- Serving on numerous Committees within the Department, the College and the University.
- Organization of the EECE Departmental Seminar Series.
- Participation in the scientific program committee and organization committee of the Memphis BioImaging Symposium (2007-2013) <http://www.membis.org/>.
- Participation in the Girls Experiencing Engineering program at the University of Memphis.
- Affiliate faculty in the Center of Advanced Sensors in the Herff College of Engineering.
- Affiliate faculty in the Center for Research on Women (CROW) <http://www.memphis.edu/crow/about.htm> and participation in the Women's Academic Network (Jan. 2009 – present).

***Washington University in St. Louis, MO:***

Research Associate, Electronic Systems and Signals Research Laboratory, Sept. 2000 – Aug. 2006.

- Development of computational methods for measuring 3-Dimensional Cell Attributes with DIC microscopy as part of the development of a quantitative DIC microscope.
- Participation in the development of a noninvasive hyperspectral device for real time imaging and characterization of living tissues and systems of biomedical importance. The device will integrate interferometric sensors, focal plane arrays, a computer cluster, and novel computational methods for data processing to extract spectral information.
- Development of calibration methods for data acquired with focal plane arrays in high performance environments.
- Development of a maximum-likelihood restoration method based on a depth-variant imaging model for three-dimensional fluorescence microscopy.
- Participation in the information-theoretic signal and image processing research thrust of the Center for Security Technologies (<http://www.cst.wustl.edu>).
- Participation in the development of an imaging model for the hyperspectral-imaging sensor Discrete Array Scanning Interferometer (DASI) and in spectrum estimation from quantum-limited interferograms acquired with the DASI.
- Investigation of possible improvements for parametric blind deconvolution methods applied to fluorescence microscopy.
- Participation in the preparation of grant proposals (see **Active, Pending, and Completed Research Support** listed below)

Instructor, Electrical and Systems Engineering Department, Sept. 2000 – Aug. 2006.

- Taught one or two courses per semester; A list of courses is provided below under **Courses Taught**. Served on the committee preparing for the 2006 ABET renewal of the 3 degree programs in the Electrical and Systems Engineering department. Collection and organization of the required material and participation in writing the Self-study Questionnaire Report.

Research Associate, Institute for Biomedical Computing (IBC), August 1998 - June 2000.

- Participation in the development and evaluation of a Computational Optical-Sectioning

Microscopy (COSM) data-acquisition system equipped with two CCD cameras allowing concurrent dual imaging at two different emitted wavelengths.

- Development and testing of improved COSM restoration methods. Updating the XCOSM software package and maintaining its dissemination through the Internet (<http://www.essrl.wustl.edu/~preza/xcosm>).
- Continued development and testing of phase estimation methods for Differential Interference Contrast (DIC) Microscopy.
- Participation in the preparation of grant proposals.

Research Assistant, Biomedical Computer Laboratory, IBC, July 1987- July 1998.

- Participated in the development and evaluation of a COSM system: a conventional light microscope equipped with a computer-controlled stepping motor and cooled CCD camera that enables three-dimensional data acquisition over time.
- Development and testing of imaging models and image-restoration methods for the reduction of out-of-focus light in three-dimensional images acquired with optical-sectioning fluorescence microscopy.
- Participation in the development, dissemination, and maintenance of the XCOSM software package; XCOSM features five COSM restoration methods.
- Development and evaluation of imaging models for Nomarski DIC Microscopy. Development of a robust phase estimation method based on these models and utilizing rotationally diverse DIC images (i.e. DIC images acquired by rotating the underlying specimen around the optical axis).
- Participation in the preparation of successfully funded grant proposals for Research Projects 1-3 listed below under **Completed Research Support**.

***University of Cyprus, Nicosia, Cyprus:***

Contributing to the development of the Electrical and Computer Engineering (ECE) Department of the newly established School of Engineering at the University of Cyprus, while full filling the home-country residency immigration requirement for permanent residency in the USA. Title and responsibilities were:

Visiting Assistant Professor, Electrical and Computer Engineering Dept., Sept. 2003 – June 2004

- Instruction of one course per semester.
- Development of the ECE curriculum and graduate programs.
- Investigation of possible improvements of *fluorescence in situ hybridization* (FISH) images from chromosomes by computational methods in collaboration with the Cyprus Institute of Neurology and Genetics.

**Consulting and Industrial Experience**

***Ikonisys, Inc., New Haven, CT, September 2004 - January 2005:***

Assessing the quality of three-dimensional data acquired with wide field fluorescence optical-sectioning microscopy for the identification of chromosomes in fluorescence in situ hybridization (FISH) images. Processing FISH images with our computational methods, in order to remove degradations due to the optical system, the CCD camera, and fluorescence photo bleaching.

**Support**

The external funding from NSF for which I am the principal investigator (PI) to date totals **\$1,927,706**.

### ***Active Research Support***

Title: “*IDBR TYPE A - Improving 3D resolution and reducing sensitivity to spherical aberration in live, thick sample cellular imaging using novel methods in optical sectioning microscopy*”, PI: C. Preza; co-PI: O. Skalli, Univ. of Memphis; Collaborators: G. Saavedra and M. Martinez-Coral, Univ. of Valencia, Spain; C. Waters, Univ. of Tennessee Health Science Center

Source of Support: National Science Foundation Type: Instrument Development

Total Award Amount: \$ **750,096**

Total Award Period Covered: 09/01/14 - 08/31/17

Location of Project: The University of Memphis

Person-Months Per Year Committed to the Project: 1.71 Summer months on the average

This project is to develop a robust and flexible computational optical system with improved 3D resolution and reduced sensitivity to depth-induced aberrations that will greatly extend the capabilities of optical-sectioning microscopy for use in a wide range of biological applications.

### ***Completed Research Support***

*I participated in the preparation of the following proposal(s) and in carrying out the research involved:*

1. Title: “*CAREER: Integrated computational optical framework for quantitative space-variant imaging in live-cell fluorescence microscopy*”, PI: Chrysanthe Preza, Collaborators: C. Waters, Univ. of Tennessee Health Science Center, O. Skalli, Univ. of Memphis.

Agency: National Science Foundation; Type: CAREER

Period: 03/01/09 - 2/28/15; Funds: \$ **791,402** (includes a 1 year no-cost extension)

Person-Months Per Year Committed to the Project: 2 summer months

The goal of this project was to develop new computational methods to account for aberrations due to “thick” biological specimens. The methods developed were integrated with a novel optical non-scanning imaging system design to enable fast live-cell fluorescence microscopy imaging with high, isotropic 3D resolution.

2. Title: “*Collaborative Research: Multimode adaptive 3D microscopy for quantitative analysis of live-cellular dynamic processes in thick samples*”, PI: Chrysanthe Preza,

PI at University of Colorado at Boulder (leading institution): R. Piestun.

Collaborators: C. Waters, UTHSC, R. Fischer NBHL

Agency: National Science Foundation; Type: Instrumentation and Instrument Development

Period: 06/01/09 - 05/31/13 (includes a year of no-cost extension); Funds for C. Preza: **\$168,952**

Person-Months per Year Committed to the Project: 0 summer months

The goal of this project was to investigate, develop, and evaluate a multi-modal microscope with greatly enhanced three-dimensional resolution to enable visualization and measurement of live-cellular dynamic processes in thick samples that might otherwise go undetected.

3. Title: “*Collaborative Research: Quantitative DIC Microscope for Measuring 3-Dimensional Cell Attributes*”, PI: Chrysanthe Preza; PI at University of Colorado Boulder, C. Cogswell.

Agency: National Science Foundation; Type: Instrumentation and Instrument Development

Period: September 1, 2005 – August 31st, 2009 (includes 1-year no-cost extension);

Funds for Preza: **\$ 217,256**

Person-Months Per Year Committed to the Project: 2 summer months

Goal: This project developed an integrated optical and digital system that greatly extends the capabilities of differential interference contrast (DIC) microscopy for use in a wide range of biological applications.

4. Title: “*Sensors for Material Identification, Detection and Characterization*”, PI: Steve Griffin  
Agency: Arkansas State Univ.; Period: 07/01/10 - 02/19/12; Funds for C. Preza (Co-PI): **\$27,000**  
Person-Months per Year Committed to the Project: 10% of AY time and 1/2 summer month  
This project is to develop engineering designs for integrated technologies for field use of enhanced dual pulse LIBS and CW-CRD infrared capability and assess the applicability of these designs for incorporation into a screening portal or a remotely operated autonomous robot.
5. Title: “*Distributed Intelligence in Biologically-Motivated Multi-Agent Systems for Employment in Complex Warfare Scenarios and in Hostile Environments*”, R. Kozma (PI); K. Ifterkharuddin (Co-PI); L. Wang, C. Preza, M. Yeasin (Research team members)  
Type: FedEx Institute of Technology (at The University of Memphis) Research Grant  
Period: 8/2008 - 6/2009; Funds for C. Preza: **\$12,000**
6. Title “Analysis and Modeling of Nyquist Limited Infrared Detectors”, PI: Eddie Jacobs; C. Halford, S, Chari, A. Robinson, and C. Preza (Research Members).  
The goal of this project is to develop physics based models and simulations of image formation in the presence of turbidity. The project focuses on sub-wavelength detectors, propagation in turbid media (Dust/Propeller wash) and on the development of equivalent NVThermIP inputs to model these effects. In addition, image processing algorithms for mitigating the effects of the obscurant will be evaluated.  
Company: Northrop Grumman Systems Co.  
Period: March 2010 – November 2010; Funds for Preza: **\$16,725**  
Person-Months Per Year Committed to the Project: 1 summer month

### Academic Honors

- Recipient of the Ralph Faudree Professorship, University of Memphis, 2015-present.
- Herff Outstanding Faculty Research Award, Herff College of Eng., the Univ. of Memphis, 2010 & 2015.
- University of Memphis PI Millionaire, 2014.
- NSF CAREER Award, 2009.
- Featured in the OSA’s 2017 Women in Optics Monthly Planner
- Minorities and Women in Science Interview Series, OSA, April 2012.  
[http://www.osa.org/membership/grants\\_recognitions\\_special\\_services/mwosa/profiles](http://www.osa.org/membership/grants_recognitions_special_services/mwosa/profiles)
- Ring Faculty Award, Herff College of Engineering, 2011-2013.
- Montclair Who’s Who in Collegiate Faculty, 2010-2011.
- Marquis Who’s Who in America, 65<sup>th</sup> Edition, 2011.
- Best Poster Award, *Memphis BioImaging Symposium*, 2009.
- Journal of the Optical Society of America Publications Award, July 1999.

- B.S.E.E. cum laude, B.S.C.S. cum laude, 1987.
- Tau Beta Pi and Eta Kappa Nu, Engineering Honoraries, 1986.
- Undergraduate Studies Scholarship, the Cyprus-America Scholarship Program (CASP) of the Cyprus Fulbright Commission, awarded for academic excellence and providing full tuition at Washington University in St. Louis and monthly stipend, 1983-1987.

### **Additional Professional Activities**

- Topical Editor for *Applied Optics*, 2016 – present.
- Lead Guest Editor, feature issue on "Modern Imaging" in *Applied Optics*, 2016-2017.
- Instructor, Tutorial on "Digital Imaging Principles", *Optical Microscopy and Imaging in Biomedical Sciences Course* at the Marine Biology Laboratory, Woods Hole, MA, 2016.
- Co-Chair (2015 and 2016) and Program Committee Member, *Computational Optical Sensing and Imaging*, part of the Optical Society of America (OSA), Imaging and Applied Optics Congress, 2011 – present.
- Program Committee Member, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing*, BiOS, SPIE Photonics West, 2008 – present
- Conference Session Chair, Focus in Microscopy 2014, Sydney, Australia.
- Conference Session Chair, *Phase: Multimodal microscopy*, in *Focus on Microscopy*, Maastricht, the Netherlands, 2013.
- Invited Participant, *IEEE Engineering in Medicine and Biology Society (EMBS) Forum on Grand Challenges in Biomedical Imaging*, March 1-2, Bethesda, Maryland, 2012.
- Program Committee Member, *IEEE International Conference of Electro/Information Technology*, IUPUI, Indianapolis, May 6-8, 2012.
- Invited Participant, *Workshop on Computationally Enhanced Optical Imaging*, Northeastern University, Boston, MA, Aug. 30, 2011.
- Invited Lecturer, *I-CAMP 2011 School*, Argentina-Uruguay, May 28-June 17, 2011.
- Conference Session Chair, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing*, BiOS, SPIE Photonics West, CA, 2003, 2008, 2010-2014, & 2016.
- Conference Session Chair, *Medical Image Processing I*, Digital Image Processing and Analysis (DIPA), OSA Imaging and Applied Optics Congress, Tucson, Arizona, 2010.
- Program Committee Member, *International Conference on Computational Photography (ICCP)*, IEEE, MIT, 2010.
- Conference Session Chair, *Confocal, Multiphoton, and Nonlinear Microscopic Imaging*, European Conferences on Biomedical Optics, OSA and SPIE, Munich, 2007.
- Scientific and Organizing Committee Member, *Memphis BioImaging Symposium (MemBIS)*, 2007 – 2013  
Conference Co-Chair, 2011-2013; Scientific Program Chair, 2010; Pre-conference Workshop Chair, 2009; Student Program co-Chair, 2008.
- Participant, *National Effective Teaching Institute (NETI-1B)*, Tampa, FL, January 4-6, 2013.
- Invited Participant, *NSF ADVANCE Community Building Workshop for Junior Women*

Faculty in Engineering, Virginia Beach, VA, July 21 – 24, 2009.

- **Scientific Reviewer/Participation in Proposal Review Panels** for the following:  
*Journal of the Optical Society of America, Applied Optics, Optics Express, IEEE Transactions on Image Processing, Journal of Microscopy, Central European Journal of Physics, IEEE International Symposium on Biomedical Imaging, 2011, 2012 OSA Computational Optical Sensing and Imaging Conference, 2011 – present NSF Proposals in Advances in Bio Informatics 2010 NSF Proposals in Instrument Development for Biological Research 2014, 2015 NIH Proposals in Enabling Bioanalytical & Imaging Technologies 2011, 2013*
- **Professional Affiliations** (Current and Past)  
Senior Member, Optical Society of America (OSA)  
Senior Member, International Society for Optical Engineering (SPIE)  
Member, Institute of Electrical and Electronics Engineers (IEEE)  
Member, IEEE Women in Engineering  
Member, The Society of Women Engineers (SWE)  
Member, American Society for Engineering Education (ASEE)  
Member, Microscopical Society of America

**Publications** (Available online at <http://cirl.memphis.edu> )

### Invited Book Chapter

Preza, C., King, S. V., Dragomir, N. M., Cogswell, C. J., “Phase Imaging Microscopy – Beyond Darkfield, Phase and Differential Interference Contrast (DIC) Microscopy,” in *Handbook of Biomedical Optics*, Boas, D. A., Pitris C., and Ramanujam, N., eds., Taylor and Francis Books, 2011.

### Journal Publications

1. Patwary, N., Shabani, H., Doblaz, A., Saavedra, G., and **Preza, C.**, “Experimental validation of a customized phase mask designed to enable efficient computational optical sectioning microscopy through wavefront encoding,” *Applied Optics, Modern Imaging feature*, **56**(9), D14-D23, doi: [10.1364/AO.56.000D14](https://doi.org/10.1364/AO.56.000D14), 2017.
2. Patwary, N., King, S. V., Saavedra, G., and **Preza, C.**, Reducing effects of aberration in 3D fluorescence imaging using wavefront coding with a radially symmetric phase mask”, *Optics Express*, 24(12), 12905-12921, doi: [10.1364/OE.24.012905](https://doi.org/10.1364/OE.24.012905), 2016.
3. Ghosh, S. and Preza, C., “Three-Dimensional Block-Based Restoration Integrated with Wide-field Fluorescence Microscopy for the Investigation of Thick Specimens with Spatially Variant Refractive Index,” *J. Biomed. Opt.*, 21(4), 046010, doi: [10.1117/1.JBO.21.4.046010](https://doi.org/10.1117/1.JBO.21.4.046010), 2016.
4. King, S. V., Doblaz, A., Patwary, N., Saavedra, G., Martinez-Corral, M. and **Preza, C.**, “Spatial light modulator phase mask implementation of wavefront encoded 3D computational-optical microscopy”, *Applied Optics*, *Applied Optics*, 54(29), 8587-8595, doi: [10.1364/AO.54.008587](https://doi.org/10.1364/AO.54.008587), 2015.
5. Patwary, N., and **Preza, C.**, “Image restoration for three-dimensional fluorescence microscopy using an orthonormal basis for efficient representation of depth-variant point-spread functions”, *Biomed. Opt. Express* **6**(10), 3826-3841, doi: [10.1364/BOE.6.003826](https://doi.org/10.1364/BOE.6.003826), 2015.



6. Ghosh, S. and **Preza, C.**, “Fluorescence microscopy point spread function model accounting for aberrations due to refractive index variability within a specimen,” *J. Biomed. Opt.*, **20**(7), 075003, doi: [10.1117/1.JBO.20.7.075003](https://doi.org/10.1117/1.JBO.20.7.075003), 2015.
7. Ghosh, S. and **Preza, C.**, “Characterization of a 3D DH-PSF for fluorescence microscopy in the presence of spherical aberration,” *Journal of Biomedical Optics*, 18(3):036010, doi: [10.1117/1.JBO.18.3.036010](https://doi.org/10.1117/1.JBO.18.3.036010), 2013.
8. Furxhi, O., Jacobs, E. L. and **Preza, C.**, “Image plane coded aperture for Terahertz imaging,” *Optical Engineering*, 51(9), doi:[10.1117/1.OE.51.9.091612](https://doi.org/10.1117/1.OE.51.9.091612), 091612-1, 2012.
9. Yuan, S. and **Preza, C.**, “Point-spread function engineering to reduce the impact of spherical aberration on 3D computational fluorescence microscopy imaging,” *Optics Express*, 19(23), 23298-23314, doi: [10.1364/OE.19.023298](https://doi.org/10.1364/OE.19.023298), 2011.
10. King, S. V., Libertun, A. R., Piestun, R., Cogswell, C. J., **Preza, C.**, "Quantitative phase microscopy through differential interference imaging," *Journal of Biomedical Optics*, Vol. **13**(2), 024020, doi: [10.1117/1.2907328](https://doi.org/10.1117/1.2907328), 2008.
11. Fox, D. J. Jr., Tysver Velde, H., **Preza, C.**, O’Sullivan, J. A., Smith, W. H., and Woolsey, T. A., “Computational hyperspectral interferometry for studies of brain function: proof of concept,” *Applied Optics*, Vol. 45, No. 13, 3009-3021, doi: [10.1364/AO.45.003009](https://doi.org/10.1364/AO.45.003009), 2006.
12. Preza, C. and Conchello, J.-A. “Depth-Variant Maximum-Likelihood Restoration for Three-Dimensional Fluorescence Microscopy,” *Journal of the Optical Society of America A*, Vol. 21, No. 9, 1593-1601, September, 2004.
13. Fuhrmann, D. R., **Preza, C.**, O’Sullivan, J. A., Snyder, D. L., and Smith, W.H., “Spectrum Estimation from Quantum-Limited Interferograms,” *IEEE Transactions on Signal Processing*, 52(4), 950-961, April, 2004.
14. Homem, M. R. P., Mascarenhas, N. D. A., Costa, L. F., and **Preza C.**, “Biological Image Restoration in Optical-Sectioning Microscopy Using Prototype Image Constraints,” *Real Time Imaging*, special issue on *Imaging in Bioinformatics*, 8(6), 475-490, 2002.
15. Preza, C., “Rotational-diversity phase estimation from differential-interference-contrast microscopy images,” *Journal of the Optical Society of America A*, 17(3), 415-424, 2000.
16. Preza, C., Snyder, D. L., and Conchello, J.-A. “Theoretical development and experimental evaluation of imaging models for differential-interference-contrast microscopy,” *Journal of the Optical Society of America A*, 16(9), 2185-2199, 1999.
17. McNally, J. G., **Preza, C.**, Conchello, J.-A. and Thomas, Jr., L. J., “Artifacts in Computational Optical-Sectioning Microscopy,” *Journal of the Optical Society of America A*, 11(3):1056-1067, 1994.
18. Preza, C., Ollinger, J. M., McNally, J. G., and Thomas, Jr., L. J., “Point-Spread Sensitivity Analysis for Computational Optical-Sectioning Microscopy,” *Micron and Microscopica Acta*, Special issue, 23(4):501-513, 1992. (Invited paper).
19. Preza, C., Miller, M. I., Thomas, Jr., L. J., and McNally, J. G., “Regularized Linear Method for Reconstruction of Three-Dimensional Microscopic Objects from Optical Sections,” *Journal of the Optical Society of America A*, 9(2):219-228, 1992.

### **Journal Publications under Review/Revision**

1. Shabani, H., Doblaz, A., Saavedra, G., **Preza, C.**, “Improvement of two-dimensional structured illumination microscopy with an incoherent illumination pattern of tunable frequency,” *under review, Optics Express* 2017.
2. King, S. V., Hossein, Md. S., Yuan, S. and **Preza C.**, “Performance of engineered PSFs for

Extended Depth of Field Microscopy in the presence of SA evaluated through the computational imaging process”, *under revision, to be re-submitted* 2017.

3. Doblas, A., King, S. V., Patwary, N., Saavedra, G., Martinez-Corral, M. and **Preza, C.**, “Application of SQUBIC PSF design to 3D wide-field fluorescence microscopy reduces depth variability in image formation”, *under revision, to be re-submitted* 2017.

### **Journal Publications under Preparation**

1. Patwary, N., Doblas, A., and **Preza, C.**, “Image restoration approach to address reduced modulation contrast in structured illumination microscopy,” *to be submitted* 2017.
2. Preza, C., Schaefer L. H., Schuster, D., Patwary, N. and Ghaffar, A., “Model-based approach to account for spherical aberration in structured illumination microscopy,” *to be submitted*.
3. Shabani, H., Sánchez-Ortiga, E., **Preza, C.**, “Comparison of reconstruction methods used in structured illumination microscopy (review paper),” *to be submitted*.
4. Preza, C. and O’Sullivan, J. A., “Quantitative phase and amplitude imaging using an alternating minimization algorithm developed for Nomarski differential interference contrast (DIC) microscopy”, *to be submitted*.
5. Preza, C., "Quantitative 3D cell imaging with fluorescence microscopy using the COSMOS software package", *to be submitted*.

### **Peer-Reviewed Conference Publications**

1. Shabani, H., Doblas, A. and **Preza, C.**, "Simultaneous optical sectioning and super resolution in 2D-SIM using tunable structured illumination," in *Imaging and Applied Optics 2017 (COSI)* of OSA Technical Digest Series (Optical Society of America, 2017), paper CW4B, 2017.
2. Doblas, A. and **Preza, C.**, "Incoherent-based tunable frequency structured illumination microscopy," in *Imaging and Applied Optics 2017 (IS)* of OSA Technical Digest Series (Optical Society of America, 2017), paper ITh4, 2017.
3. Patwary, N., Doblas, A., and **Preza, C.**, “Computational approach to address reduced modulation contrast in structured-illumination microscopy,” in *Imaging and Applied Optics 2017 (COSI)* of OSA Technical Digest Series (Optical Society of America, 2017), paper [JTU5A](#), 2017.
4. King S. V., Taylor, C. A., Doblas, A., Shabani, H., Patwary, N., Saavedra, G. and **Preza, C.**, “Implementation of an incoherent 3-D patterned illumination design in a Structured Illumination Microscope,” Proc. SPIE 10070, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXIV*, 1007004, [doi:10.1117/12.2252910](https://doi.org/10.1117/12.2252910), 2017.
5. Shabani, H., Patwary, N., Doblas, A., Saavedra, G. and **Preza, C.**, “Comparison of two structured illumination techniques based on different 3D illumination patterns,” Proc. SPIE 10070, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXIV*, 1007013, [doi:10.1117/12.2253199](https://doi.org/10.1117/12.2253199), 2017.
6. Doblas, A., Saavedra, G. and **Preza, C.**, “Comparison of 3D structured patterns with tunable frequency for use in Structured Illumination Microscopy,” Proc. SPIE 10070, *Three-Dimensional and Multidimensional Microscopy: Image Acquisition and Processing XXIV*, 100700H, [doi:10.1117/12.2252109](https://doi.org/10.1117/12.2252109), 2017.
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### **Other Conference Publications and Presentations**

1. Preza, C., "3D Image Restoration Using Multiple Space-Varying Point Spread Functions," in *Mathematics in Imaging Conference, Imaging and Applied Optics Congress*, Optical Society of America, invited talk [MM3C](#), 2017.
2. Preza, C., Patwary, N., Shabani, H., Doblaz, A., and Saavedra, G., "PSF engineering using a fabricated SQUBIC phase mask to reduce the effect of spherical aberration in 3D wide field fluorescence Imaging," *Focus on Microscopy, Bordeaux, France*, April 10 2017.

3. Doblas, A., Shabani, H., Saavedra, G., and **Preza, C.**, “Improvement of 2D-SIM achieved based on tunable structured illumination,” *Focus on Microscopy*, Bordeaux, France, April 10 2017.
4. Shabani, H., Patwary, N., Doblas, A., Saavedra, G. and **Preza, C.**, “Investigating the effect of different 3D illumination patterns on structured illumination microscopy performance,” *Quantitative BioImaging (QBI)*, Texas A&M University, College Station, TX, Jan. 5-7, 2017.
5. Patwary, N., Shabani, H., Doblas, A., Saavedra, G. and **Preza, C.**, “Implementation of PSF engineering using a fabricated phase mask to reduce the effect of spherical aberration in 3D wide field fluorescence microscopy,” *Quantitative BioImaging (QBI)*, Texas A&M University, College Station, TX, Jan. 5-7, 2017.
6. Ghosh, G. and **Preza, C.**, “Imaging thick specimens using optical-sectioning microscopy coupled with block-based 3D image restoration,” *Quantitative BioImaging (QBI)*, Texas A&M University, College Station, TX, Jan. 5-7, 2017.
7. Ghosh, G. and **Preza, C.**, “An  $N$ -Interface point spread function model suitable for wide-field fluorescence imaging of thick specimen with variable refractive index,” *Quantitative BioImaging (QBI)*, Texas A&M University, College Station, TX, Jan. 5-7, 2017.
8. Ghosh, S. and **Preza, C.**, “Enabling imaging of optically thick samples using computational optical sectioning microscopy,” *Image Science Gordon Research Conference*, Stonehill College, Easton, MA, June 5-10, 2016.
9. Shabani, H., Sánchez-Ortiga, E. and **Preza, C.**, “Assessing super-resolution and optical sectioning capability in structured illumination microscopy,” *Image Science Gordon Research Conference*, Stonehill College, Easton, MA, June 5-10, 2016.
10. Patwary, N., King, S. V., Shabani, H. and **Preza, C.**, “Reducing the effect of depth-induced aberration in 3D fluorescence imaging using wavefront encoding” *Image Science Gordon Research Conference*, Stonehill College, Easton, MA, June 5-10, 2016.
11. Preza, C., “Advances in Computational imaging for quantitative 3D fluorescence microscopy,” *Golden Jubilee Annual Meeting of the Israeli Society for Microscopy (ISM)*, Haifa, Israel, 2016.
12. Ghosh, S. and **Preza, C.**, “Imaging thick specimens using wide-field fluorescence microscopy coupled with block-based 3D image restoration,” *Focus on Microscopy*, Taipei, Taiwan, 2016.
13. King, S. V., Patwary, N. and **Preza, C.**, “Quantitative wide-field fluorescence and phase microscopy using liquid crystal and display technology,” *EMN Meeting on Liquid Crystal*, Orlando, Florida, 2016.
14. King, S. V., Skalli, O. and **Preza, C.**, “3D imaging suitable for cellular uptake of spherical nanoparticles by accounting for spherical aberration,” *Focus on Microscopy*, Göttingen, Germany, 2015.
15. Patwary, N., King, S. V. and **Preza, C.**, “Improving 3D fluorescence imaging using a computational-optical approach to account for depth-induced aberrations,” *Quantitative BioImaging 2015*, Institut Pasteur, Paris, France, 2015.
16. Preza, C., Patwary, N., Doblas, A., King, S.V., Saavedra, G. and Martinez-Coral, M., “Addressing Depth-Induced Spherical Aberration in Computational Optical Sectioning Microscopy Using Wavefront Coding,” *Focus on Microscopy*, Sidney, Australia, April 13-16, 2014.
17. King S. V., Yuan, S., Dong, D. and **Preza, C.**, “Reducing the impact of spherical aberration on 3D microscopy imaging using programmable PSF engineering,” *Focus on Microscopy*, Maastricht, the Netherlands, March 24-27, 2013.
18. Yuan, S., and **Preza, C.**, “A new approach based on PSF engineering to reduce depth-induced aberration in 3-D fluorescence microscopy”, *Quantitative BioImaging 2013*, University of New Mexico, Albuquerque, New Mexico, 2013.
19. Yuan, S., and **Preza, C.**, “Reducing the impact of depth-induced spherical aberration on extended

- depth-of-field microscopy using PSF engineering”, *Quantitative BioImaging 2013*, University of New Mexico, Albuquerque, New Mexico, 2013.
20. Preza, C., Schaefer, L. H., Schuster, D., Ghaffar, A.-U., Yuan, S., and Lobo, G. J., “Impact of Spherical Aberration on Structured-Illumination Microscopy”, *Focus on Microscopy*, Singapore, April 1-4, 2012.
  21. Preza, C. and Yuan, S., “Reducing the Impact of Spherical Aberration on Extended depth-of-field Microscopy Using PSF Engineering”, in *Focus on Microscopy*, Singapore, April 1-4 2012.
  22. Preza, C., Yuan, S., Sporer, M. H., Mukherjee, A., Crosby, L. M., and Waters, C. M., “Investigating the use of structured-illumination microscopy as implemented in the Zeiss ApoTome attachment to image thick lung tissue slices”, *Focus on Microscopy*, Konstanz, Germany, April 2011.
  23. Yuan, S., and **Preza, C.**, “A new approach to reduce depth-introduced aberration in 3-D microscopy”, *Memphis BioImaging Symposium (MemBIS)*, Memphis, 2011.
  24. Preza, C., Ghosh, S., Grover, G., Quirin, S., Piestun, R., “Extraction of depth information in the presence of spherical aberration using double-helix point spread function coding in 3D fluorescence microscopy imaging”, in *Focus on Microscopy*, Konstanz, Germany, April 2011.
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  26. Ghosh, S., Grover, G., Piestun, R. and **Preza, C.**, “A New Paradigm in 3D Imaging Systems for Microscopy- Double-Helix Point Spread Functions”, *Memphis BioImaging Symposium (MemBIS)*, Memphis, 2010.
  27. Mukherjee, A., Yuan, S., Sporer, M. H., Crosby, L. M., Waters, C. M., and **Preza, C.**, "A Study of Image Resolution in Images Acquired from Thick Rat Lung Slices Using Structured Illumination Microscopy”, *Memphis BioImaging Symposium (MemBIS)*, Memphis, 2010.
  28. Yuan, S., Chen, Y., **Preza, C.**, and Tang, C.M., “Phantom Study on Blood-Flow Pulsation Using Laser Speckle Contrast Imaging”, *Memphis BioImaging Symposium (MemBIS)*, Memphis, 2010.
  29. Myneni, V. and **Preza, C.**, “Computational imaging for depth-variant fluorescence microscopy,” in *Focus on Microscopy*, Krakow, Poland, April 2009.
  30. Preza, C., King S. V., Libertun, A. R., and Cogswell C. J., “Computational Imaging for DIC Microscopy: Current Use in Live-Cell Imaging”, *Focus on Microscopy*, Osaka-Awaji, Japan, April 2008.
  31. Cogswell C. J., King S. V., Libertun, A. R., Piestun, R., and **Preza, C.**, “Quantitative DIC Microscopy: Improving Versatility for Live-Cell Imaging,” *Focus on Microscopy*, Valencia, Spain, April 2007.

### **Conference Publications under Preparation or Review**

1. Patwary, N., Shabani, H., King S. V., Doblaz, A., Saavedra, G. and **Preza, C.**, “Experimental evaluation of wavefront-encoded structured illumination microscopy,” 2017.
2. Patwary, N., Shabani, H. and **Preza, C.**, “Investigating the effect of spherical aberration and the use of wavefront encoding in high-NA Structured Illumination Microscopy,” 2017.
3. Simpson, A. M., Patwary, N., Skalli, O. and **Preza, C.**, “Imaging 3D distribution of lamin using structured illumination microscopy,” 2017.

### **Invited Presentations given by C. Preza**

1. “3D Image Restoration Using Multiple Space-Varying Point Spread Functions,” *Invited talk presented at Mathematics in Imaging of the OSA Imaging and Applied Optics Congress*, San



- Francisco, CA, June 26-29, 2017.
2. "Computational microscopy of optically thick samples," *Invited talk presented at the International Conference on Computational Photography (ICCP) 2017*, Stanford University, Palo Alto, CA, May 12-14, 2017.
  3. "Computational imaging for 3-D microscopy of thick samples," *Invited talk presented at the 14<sup>th</sup> Annual Advanced Imaging Methods (AIM) Workshop, University of California at Berkeley*, Berkeley, CA, January 24-27, 2017.
  4. "Digital Imaging Principles," *Invited Lecture to be presented at the Optical Microscopy and Imaging in Biomedical Sciences course at the Marine Biology Laboratory*, Woods Hole, MA, September 12, 2016.
  5. "Advances in computational imaging for quantitative 3D fluorescence microscopy," *Invited talk presented at the Golden Jubilee Annual Meeting of the Israeli Society for Microscopy (ISM)*, Haifa, Israel, May 2016. (<http://www.ismicroscopy.org.il/ism2016/plenary-speakers/>)
  6. "Imaging Thick Specimens with Spatially-Variant Refractive Index Using Wide-field Fluorescence Microscopy and Block-Based 3D Image Restoration," *Invited seminar given at the Joint Biomedical Engineering Program of The Univ. of Memphis & The Univ. of Tennessee, Health Science Center*, Memphis, Tennessee, February 26, 2016.
  7. "Computational imaging for quantitative 3D fluorescence microscopy," *Invited seminar organized by IEEE Kolkata Section and IET(UK) Kolkata Network*, Meghnad Saha Institute of Technology, Kolkata, India, December 19, 2015.
  8. "Computational imaging for 3D fluorescence microscopy: beyond deconvolution microscopy," *Invited tutorial presentation at the Quantitative BioImaging 2015*, Institut Pasteur, Paris, France, 2015. (<http://www.quantitativebioimaging.com/program/talks/>)
  9. "Computational imaging for 3D fluorescence microscopy," *Invited talk at Imaging Systems and Applications*, of the Imaging and Applied Optics Congress, OSA, Seattle, 2014.
  10. "Computational Imaging for 3D Fluorescence Microscopy," *Invited seminar given at the Seminar Series of the Physics Dept.*, Rhodes College, January 24, 2014.
  11. "3D point spread function characterization for widefield fluorescence microscopy," *Invited tutorial presentation at the Quantitative BioImaging 2013*, University of New Mexico, Albuquerque, New Mexico, 2013.
  12. "Advances in 3D Computational Imaging for Structured-Illumination Microscopy," *Invited seminar given at the Joint Biomedical Engineering Program of The Univ. of Memphis & The Univ. of Tennessee, Health Science Center*, Memphis, Tennessee, September 14, 2012.
  13. "3D Fluorescence Microscopy Imaging Using Double-Helix Point-Spread Function Engineering," *Invited seminar given at the Optical Fibers and Signal Processing Group*, The Univ. of Valencia, Spain, July 5, 2012.
  14. "New Computational Methods for Structured-Illumination Microscopy," *Invited seminar given at the Dept. of Optics*, The Univ. of Valencia, Spain, April 30, 2012.
  15. "Quantitative 3D Fluorescence Microscopy Imaging Using Computational Methods," *Invited seminar given at the Seminar Series of the Dept. of Biological Sciences*, The Univ. of Memphis, Memphis, November 10, 2011.
  16. "Computational Imaging Overview and Application to Microscopy," *Three invited lectures given at the I-CAMP 2011 School*, School of Engineering at the University of the Republic, Montevideo, Uruguay, May 28 - June 3, 2011.
  17. "Correction of Depth-Induced Aberrations in 3D Fluorescence Microscopy Imaging," *Invited*

- seminar given at the Seminar Series of the Physics Dept., The Univ. of Mississippi, Oxford, April 26, 2011.*
18. "Correction of Depth-Induced Aberrations in 3D Fluorescence Microscopy Imaging," *Invited seminar given at the Seminar Series of the Department of Electrical and Computer Engineering, Purdue School of Engineering and Technology, Indiana University / Purdue University at Indianapolis, December 9, 2010.*
  19. "Correction of Depth-Induced Aberrations in 3D Fluorescence Microscopy Imaging," *Invited seminar given at the Seminar Series of the Department of Electrical and Computer Engineering, The University of Alabama, Tuscaloosa, Alabama, November 19, 2010.*
  20. "Correction of Depth-Induced Aberrations in 3D Fluorescence Microscopy Imaging," *Invited seminar given at the Seminar Series of the Physics Dept., The Univ. of Memphis, Memphis, October 14, 2010.*
  21. "Alternating Minimization Algorithm for Quantitative Differential-Interference Contrast (DIC) Microscopy," *Invited seminar given at the Computational Optical Imaging and Sensing Seminar Series of the Electrical & Comp. Eng. Dept., Univ. of Colorado, Boulder, October 13, 2008.*
  22. "Computational Imaging for Microscopy," *Invited seminar given at the Chemical Engineering Departmental Seminar Series, Tennessee Technological University, Cookeville, Tennessee, September 30, 2008.*
  23. "Computational Optical Sectioning Microscopy," *Invited seminar given at the Electrical & Comp. Eng. Departmental Seminar Series, Univ. of Colorado, Boulder, Colorado, March 6, 2007.*
  24. "Computational Imaging for Light Microscopy," *Invited seminar given at the Joint Biomedical Engineering Program of The Univ. of Memphis & The Univ. of Tennessee, Health Science Center, Memphis, Tennessee, September 8, 2006.*
  25. "Computational Imaging for Depth-Varying Fluorescence Microscopy," *Invited seminar given at CDM Optics, Inc., Boulder, Colorado, March 17, 2006.*
  26. "Computational Imaging for Microscopy," *Invited seminar given at the Electrical & Comp. Eng. Dept., University of Colorado, Boulder, Colorado, March 14, 2006.*
  27. "Computational Imaging for Microscopy," *Invited seminar given at the Electrical & Comp. Eng. Dept., Michigan Technological Univ., Houghton, Michigan, February 16, 2006.*
  28. "Computational Imaging for Microscopy," *Invited seminar given at the Electrical & Comp. Eng. Dept., Texas A&M University, College Station, Texas, Nov. 4, 2005.*
  29. "Computational Imaging for Fluorescence Microscopy," *Invited seminar given at Ikonisys, Inc., New Haven, Connecticut, July 9, 2004.*
  30. "Computational Imaging for Microscopy," *Invited seminar given at the Electrical & Comp. Eng. Dept., Purdue University, West Lafayette, Indianapolis, May 5, 2003.*
  31. "Computational Imaging for Microscopy," *Invited seminar given at the Electrical and Computer Engineering Department, University of Cyprus, Nicosia, Cyprus, March, 2003.*
  32. "Progress in Quantitative Differential-Interference-Contrast Microscopy Using Rotational-Diversity Phase Estimation," presented at *The Donald L. Snyder Workshop, Washington University, St. Louis, MO, 2000.*
  33. "Phase Estimation Using Rotational Diversity for Differential Interference Contrast Microscopy," *Invited seminar given at the Electrical, Computer, & Systems Engineering Department, Rensselaer Polytechnic Institute, Troy, New York, February 26, 1998.*
  34. "Computational Microscopy," *Invited seminar given at The Cyprus Institute of Neurology and Genetics, Nicosia, Cyprus, October 23, 1997.*

35. “Imaging Models for Transmitted-Light DIC Microscopy”, *Invited seminar given at the Center for Light Microscope Imaging and Biotechnology*, Carnegie Mellon University, Pittsburgh, Pennsylvania, July 10, 1996.
36. “Comparison of Image Restoration Algorithms,” *Invited presentation given at the IBC’s Tutorial on Image Restoration for Three-Dimensional Microscopy*, Institute for Biomedical Computing, Washington University, St. Louis, MO, April 26-27, 1996.
37. “Regularized Linear Method for Computational Optical-Sectioning Microscopy,” *Invited seminar given at the Center for Light Microscope Imaging and Biotechnology*, Carnegie Mellon University, Pittsburgh, Pennsylvania, April 2, 1992.

## Service

### *At the Univ. of Memphis*

University Council for Graduate Studies	Aug. 2014 – May 2016
Faculty Advisory Committee for Research	Jan. 2009
Center for Research on Women (CROW)- Affiliate Faculty	Jan 2012 - present
Herff College of Engineering Student Handbook Committee	Fall 2007
Herff College of Engineering (HCOE) Diversity Committee	Aug. 2006 - present
Herff College of Engineering Retention Committee	Aug. 2010 - present
Herff College of Engineering Graduate Coordinators Committee	Aug. 2013 - present
HCOE Graduate Studies Workflow Team	Aug. 2013 – present
Associate Chair, Electrical and Computer Eng. (EECE) Dept.	Jan. 2016 - present
Coordinator for Graduate Studies, EECE Dept.	Aug. 2013 – Aug. 2016
EECE Undergraduate Curriculum Committee	Aug. 2006 - 2013
EECE Graduate Curriculum Committee	Aug. 2006 – present
EECE Executive Committee	Aug. 2014 - present
Technical Area Group / ABET Committee	Jan. 2007 - present
Capstone Design Committee	2007 & 2009
EECE Seminar Series Committee	Aug. 2007 – present
MemphiSTEM Undergraduate Research Program	Jan. 2010 - present
Girls Experiencing Engineering (GEE) – HCOE outreach education program	June 2010 & 2012

### *At Washington University*

ABET Committee	Sep. 2004 - June 2006
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## Outreach Activities

- Local Chapter of the Daughters of Penelope, Education Committee, Chair, 2007- present  
Responsibility: Review applications for University Education Scholarships and recommend scholarship recipient (<http://www.daughtersofpenelope.org/> ).

- Center for Research on Women (CROW), Affiliate Faculty, 2009 –present  
Supporting and participating in CROW events.

- Girls Experiencing Engineering (GEE), Instructor, June 2010 & 2012  
Designed and instructed a two-day *Imaging Science Focus Session* with hands on activities for high school girls using our COSMOS software package.

## **Courses Taught**

*At Washington Univ., the Univ. of Cyprus and since fall 2006 at the Univ. of Memphis.*

### ***Courses Proposed and Developed***

- **Professional Development/Research Methods**, (required graduate level course) fall 2014, 2015 & 2016. Electrical and computer engineering research methods, development issues and ethics in academia and engineering practice. Students learn how to conduct literature search, write progress reports, publications, and proposals as well as prepare and give oral and poster presentations.
- **Inverse Problems in Imaging/Computational Methods for Inverse Problems** (special topic graduate level courses), fall 2008, spring 2015. A study of the principles of linear inverse problems, computational methods of their approximate solution, and practical application in imaging. Study of optimization methods and regularization principles for the solution of ill-posed inverse problems.
- **Computational Optical Imaging** (special topic graduate level course), fall 2010. A study of special topics in computational optical imaging including compressive sensing, structured illumination, wavefront encoding to extend the depth of field, correct aberration and provide super resolution in imaging systems.
- **Fourier Methods in Imaging** (special topic graduate level course), spring 2013. Mathematical tools to model and predict the action of imaging systems. Representation of images and systems in both continuous and discrete domains. Characterization of systems and their effect on the quality of their output images.
- **Signals and Systems I** (required junior level course), fall 2010-2013, spring 2011-2014. Elementary concepts of continuous-time signals and systems. Analysis of linear time-invariant systems: convolution, Fourier series, Fourier transforms and Laplace transforms. Principles of sampling and modulation.
- **Introduction to Electrical and Computer Engineering** (required freshman level course), spring 2003, fall 2003. Fundamental aspects of engineering including physics and physical devices, mathematical modeling, analytical problem solving, engineering design, and laboratory experimentation. Course topics and skills are integrated in design projects on contemporary applications.
- **Introduction to Information Technology** (freshman level course), spring 2004. Basic concepts on information representation (A/D conversion, binary representation), storage (magnetic, optical), transmission (wired, fiber-optic, radio and satellite), and security for various forms of information (audio, image, and video). Basic principles of operation for: high-tech devices (mobile phones, GPS devices etc.), telephone and computer networks, and the World Wide Web.

### ***Courses Revised***

- **Image Processing** (graduate level course), fall 2012, spring 2014 & 2016. Theory and applications of digital image processing, sampling, quantization, enhancement, modeling and restoration of images; use of segmentation, descriptors, and pattern recognition.
- **Fourier Optics** (graduate level course), spring 2007 - 2010. Analysis of two-dimensional linear systems, scalar diffraction theory, Fresnel and Fraunhofer diffraction; Fourier transforming properties of lenses, spatial frequency analysis of optical systems, optical information processing and holography.
- **Transform Methods** (junior level course), fall 2001, 2006-2009 and spring 2010. Elementary concepts of continuous-time and discrete-time signals and systems. Analysis of linear time-

invariant systems: convolution, Fourier series, Fourier transforms, Laplace and Z transforms. Principles of sampling and modulation.

- **Communication Theory** (senior level course), spring 2001-2003, 2009 & 2015. Amplitude and angle modulation for the transmission of continuous-time signals. Analog-to-digital conversion and pulse code modulation. Transmission of digital data. Introduction to random signals and noise and their effects on communication. Overview of various communication technologies.

#### *Other Courses*

- **Random Signals and Noise** (graduate level course), fall 2012. Statistical methods for describing and analyzing random signals and noise; auto-correlation, cross-correlation, and spectral density functions; optimal linear filter theory.
- **Electrical Engineering Senior Design Projects** (senior level course), spring 1999. Working in teams, students address design tasks assigned by faculty (this semester, students were given specifications to design and build a motion detector). Projects are chosen to emphasize the design process, with the designers choosing one of several paths to a possible result. Collaboration with industry and all divisions of the University is encouraged.
- **Introduction to Electrical Networks** (sophomore/junior level course), fall 2004, 2005 and spring 2005, 2006. Elements, sources, and interconnects. Ohm's and Kirchhoff's laws, superposition and Thevenin's theorem; the resistive circuit, transient analysis, sinusoidal analysis, and frequency response.
- **Electrical and Electronic Circuits Laboratory** (sophomore level course), spring 2002, 2005 and fall 2002. Lectures and laboratory exercises on introductory networks and basic electronics.
- Guest Lectures on "Computational imaging for 3D microscopy" as part of **Light Microscopy: Theory and Applications** (graduate level Biology course) spring 2012.
- Guest Lectures on "Optics of microscopes" as part of **Optical Imaging** (graduate level course), spring 1991, 1994, and 1997.
- Guest Lecture on "Three-dimensional microscopy and deconvolution" as part of **Optical Bioelectric Imaging** (graduate level course in Biomedical Engineering), fall 2005.

#### **Research Assistants Supervised**

##### *Current*

**Research Assistant Professor:** Ana Doblaz

**Graduate Students:** Nurmohammed Patwary; Hasti Shabani; Hanieh Shabani; Ananya Dutta; Wessam Al Amiri

**Undergraduate Students:** Joshua Kelly

##### *Past*

*At The Univ. of Memphis*

**Research Assistant Professor:** Sharon V. King

**Post-Doctoral Associates:** Sharon V. King; Shuai Yuan; Jing Zheng

**Graduate Students:** Sreya Ghosh (currently a post doc at Univ. of California San Diego); Christopher A. Taylor; Md. Shohag Hossain; Matthew Bledsoe; Md. Mizanur Rahman; Gregorio Lobo; Monica V. Zugravu; Amaradri Mukherjee; Rakesh Duggirala; Abhilash K. Challa; Vimeetha Myneni; Siva P. Kinthada; Aaryani Tipirneni; Moshir Rahman; Udaya Gollamudi; Yipin Zhou; Daqi Dong; Karththika R. Muthukuri

**Undergraduate Students:** Mark H. Sporer; Andrew Jenkins; Timothy Mathis; Gregorio Lobo; Matthew Fergusson; Christopher A. Taylor

*At Washington University*

**Graduate Students:** Sibó Li; Murillo R. Homem

## **Research Collaborators**

### ***Current***

Jason Braasch – The University of Memphis

Ana Doblás – The University of Memphis

Sharon V. King – St. Jude Children’s Research Hospital

Manuel Martínez-Coral – University of Valencia, Spain

Joseph A. O’Sullivan – Washington University

Genaro Saavedra – University of Valencia, Spain

Lutz H. Schaefer – Advanced Imaging Methodology Consultation, Canada

Dietwald Schuster - Hochschule Regensburg - University of Applied Sciences

Omar Skalli – The University of Memphis

Deborah Tollefsen – The University of Memphis

Christopher Waters – Univ. of Tennessee Health Science Center

### ***Past***

Carol J. Cogswell – University of Colorado at Boulder

Jose-Angel Conchello – Harvard University Center for Brain Science

Nicoleta Dragomir –Victoria University, Australia

Daniel R. Fuhrmann – Michigan Tech

Orges Furxhi – St. Johns Optical Systems

Steven T. Griffin – The University of Memphis

Khan M. Iftekharuddin – Old Dominion University

Stephanie Ivey –The Univ. of Memphis

Eddie Jacobs – The Univ. of Memphis

Robert Kozma –The Univ. of Memphis

James G. McNally – Helmholtz-Zentrum Berlin, Germany

Michael I. Miller – Johns Hopkins University

John Ollinger – Walter Reed National Military Medical Center

Rafael Piestun – University of Colorado at Boulder

Aaron Robinson –The Univ. of Memphis

Donald L. Snyder – Washington University

William H. Smith – Washington University

Lan Wang –The Univ. of Memphis

Thomas A. Woolsey – Washington University

## References

The following persons can be contacted for more information about Chrysanthe Preza:

- **A former colleague and current collaborator at Washington University in St. Louis**

Dr. Joseph A. O'Sullivan

Professor and Dean of the UMSL/WUSTL Joint Undergraduate Engineering Program

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- **Former collaborator at the University of Colorado Boulder**

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Professor

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The University of Colorado Boulder

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- **My former Chair at the University of Memphis**

Dr. David J. Russomanno

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Professor, Dept. of Electrical and Computer Engineering, IUPUI

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- **My doctoral research advisor at Washington University in St. Louis**

Dr. Donald L. Snyder

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