CURRICULUM VITAE

Ricardo A. Bernal

Address: The University of Texas at El Paso
Department of Chemistry
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Education and Training:

Postdoctoral 12/02 – 8/06 (Cryo-Electron Microscopy)
Medical Research Council – Laboratory of Molecular Biology, Cambridge, U. K.
Daniela Stock, Sponsor

- 3D Structure determination of the yeast and bacterial ATPases by cryo-electron microscopy.

Ph.D. 12/02 (X-Ray Crystallography & Cryo-Electron Microscopy).
Purdue University, West Lafayette, Indiana.
Michael G. Rossmann, Advisor.

- "Structural studies of bacteriophage alpha-3 assembly".

M.S. 5/93 (Biological Sciences).
The University of Texas at El Paso, El Paso, Texas.
Perpetua Muganda, Advisor.

- "Characterization and identification of a casein kinase activity extracted from cells transformed by human cytomegalovirus".

B.S. 8/90 (Microbiology).
Texas A&M University, College Station, Texas.

Honors, Awards:

- Biophysics Training Grant Fellowship, Purdue University, 1997-2000.
- GAANN Research Fellowship, Purdue University 2000-2002.
- EMBO Postdoctoral Research Fellow 2002-2004.
- MRC Career Development Award Postdoctoral Fellowship 2004-2006.
- Full member Sigma Xi, 2007.
- Graduate Marshal for Students, Spring 2012 Commencement Ceremony, May 2012.
- Tenure and Promotion to Associate Professor, September 1, 2012.
- ORSP Award for Outstanding Efforts in Securing Extramural Funding, Office of Research and Sponsored Projects, April 15, 2015.
- ORSP Award for Outstanding Efforts in Securing Extramural Funding, Office of Research and Sponsored Projects, September 29, 2016.
- UTEP College of Science Faculty Research Mentoring Award, December 6, 2016.

Professional Memberships

- Sigma Xi, Full Member. (2007 - Present).
- American Chemical Society. (May 1993 - Present).
- Tri-beta Biological Honor Society. (1992 - Present).

Research and Professional Experience:

9/12-present

The University of Texas at El Paso, Chemistry Department, El Paso, TX 79968, USA
Associate Professor

- Macromolecular interactions in viruses, ATPases, and chaperonins that lead to the formation of functionally active protein complexes.
- Molecular Biology (cloning, mutagenesis), Biochemistry (protein expression, purification and functional characterization), X-ray crystallography and Cryo-Electron Microscopy.

8/06-8/12

The University of Texas at El Paso, Chemistry Department, El Paso, TX 79968, USA
Assistant Professor

- Structural Biochemistry of large macromolecular complexes.

11/02-8/06

Medical Research Council – Laboratory of Molecular Biology, Cambridge, UK
Postdoctoral Research Fellow

- 3D Structure determination of the yeast V-type ATPase using cryo-electron microscopy.
- 3D Structure determination of the *Thermus thermophilus* ATPase by electron microscopy.

8/96-11/02

Purdue University, West Lafayette, Indiana.
Graduate Research

- X-ray structure determination of the bacteriophage α3 mature virion
- X-ray structure determination of the bacteriophage α3/φX174 chimeric virion.
- Cryo-electron microscopic reconstruction of bacteriophage α3 procapsid

3/95-8/96

National Cancer Institute - Frederick Cancer Research and Development Center, Frederick, MD
Laboratory of Drug Discovery Research and Development, DTP-DCT.
Senior Research Technician.

- Anti-cancer agents derived from natural products. Natural product inhibitors of ras/raf signal transduction.
- Anti-HIV agents derived from natural products.

1/94-2/95

National Cancer Institute - Frederick Cancer Research and Development Center, Frederick, MD
Laboratory of Viral Carcinogenesis, Viral Pathology Section.
Senior Research Technician.

- Characterization of 3pK, a new MAP kinase activated protein kinase.
  - Purified 3pK for kinase assays and for antibody production.
  - Characterized 3pK by immunohistochemistry, cell fractionations, ^{35}S Pulse-chase and in-vivo ^{32}P labeling, transient cell transfections, and protein kinase assays

Manuscripts in Preparation or in Press:

- Adrian Enriquez, Sudheer K. Molugu, Jihui Li, Zacariah L. Hildenbrand, and **Ricardo A Bernal** (2017) Human hsp60 expressed in *E. coli* yields fully assembled and functional chaperonin that can be isolated in various conformations. In preparation
- Nadia Herrera, Maxim V. Filchikov, Zacariah Hildenbrand, Sudheer Molugu, Vadim V. Mesyanzhinov, Konstantin A. Miroshnikov and **Ricardo A. Bernal** (2017). Biochemical Characterization of a Lysozyme Encoded by Bacteriophage SN. In preparation

Commentary on Bernal Publication:

- Yizhi Jane Tao, Wenjie Zheng (2011). Chaperones and the maturation of steroid hormone receptor complexes. ***Oncotarget*. 2011 Jan-Feb;2(1-2):43-58.** **Commentary On**: Hildenbrand ZL, Molugu SK, Herrera N, Ramirez C, Xiao C, **Bernal RA.** (2011) Hsp90 can Accommodate the Simultaneous Binding of the FKBP52 and HOP Proteins. Oncotarget. 2011; 2: 45-58. (March 10, 2011).

Original Refereed Publications:

- Adrian S. Enriquez, Humberto M. Rojo, Jay M. Bhatt, Sudheer K. Molugu, Zacariah L. Hildenbrand, and **Ricardo A. Bernal** (2017) The Human Mitochondrial Hsp60 in the APO Conformation Forms a Stable Tetradecameric Complex. **Cell Cycle**. 2017 Jun 8:1-11, PMID: 28594255
- Christine M. Calton, Matthew P. Bronnimann, Ariana R. Manson, Shuaizhi Li, Janice A. Chapman, Marcela Suarez-Berumen, Tatum R. Williamson, Sudheer K. Molugu, **Ricardo A. Bernal**, and Samuel K. Campos (2017) Translocation of the Papillomavirus 1 L2/vDNA Complex Across the Limiting Membrane Requires the Onset of Mitosis. **PLoS Pathogens**. 2017 May 2;13(5). PMID: 28463988
- Sudheer K Molugu, Zacariah L Hildenbrand, David Gene Morgan, Michael B Sherman, Lilin He, Costa Georgopoulos, Natalia V Sernova, Lidia P Kurochkina, Vadim V Mesyanzhinov, Konstantin A Miroshnikov, **Ricardo A Bernal** (2016) Ring Separation Highlights the Protein-Folding Mechanism Used by the Phage EL-Encoded Chaperonin. **Structure**. April 2016, 24(4); pages 537-546. 2016 Apr 5;24(4):537-46. PubMed PMID: 26996960
- Chaston JJ, Smits C, Aragão D, Wong AS, Ahsan B, Sandin S, Molugu SK, Molugu SK, **Bernal RA**, Stock D, Stewart AG. (2016) Structural and Functional Insights into the Evolution and Stress Adaptation of Type II Chaperonins. **Structure**. 2016 Mar 1;24(3):364-74, PubMed PMID: 26853941.
- Molugu SK, Li J, **Bernal RA**. (2015) Separation of E. coli chaperonin groEL from β-galactosidase without denaturation. **J Chromatogr B Analyt Technol Biomed Life Sci.** 2015 Dec 15;1007:93-9. PubMed PMID: 26590880.
- Tafoya D, Hildenbrand Z, Herrera N, Molugu S, Mesyanzhinov V, Miroshnikov K, **Bernal RA**. (2013) Enzymatic characterization of a lysin encoded by bacteriophage EL. **Bacteriophage** 2013; PMID: 24228221
- Hildenbrand, Zacariah L., Molugu, Sudheer K., and **Bernal Ricardo A.** (2012) Anchoring and scaffolding: V_1-ATPase interactions with widespread implications**.** **Cell Cycle** 11(11): pages 2041-2042. PMID: 22592525
- M. V. Filchikov, D. I. Osmakov, L. V. Logovskaya, N. N. Sykilinda, V. A. Kadykov, L. P. Kurochkina, V. V. Mesyanzhinov, **R. A. Bernal**, K. A. Miroshnikov (2012) Pseudomonas

Aeruginosa bacteriophage SN: 3D-reconstruction of the capsid and identification of surface proteins by electron microscopy. **Russian Journal of Bioorganic Chemistry** 04/2012; 35(6):728-733. PMID: 20208580

- Hildenbrand Zacariah L, **Bernal Ricardo A**. (2012) Interplay between Hsp90 and TPR domain-containing proteins in steroidogenic signaling. **Cell Cycle**. Apr 1; 11(7), pages 1263-1264. PMID: 22421152
- Zacariah L. Hildenbrand and **Ricardo A. Bernal** (2012). Chaperonin-mediated folding of viral proteins; **In: Viral Molecular Machines**, Rao and Rossmann Editors. Springer, 2011. Chapter 13 pages 307-324. PMID: 22297519
- Min Zhou, Nina Morgner, Nelson P. Barrera, Argyris Politis, Shoshanna C Isaacson, Dijana Matak-Vinković, Takeshi Murata, **Ricardo A. Bernal**, Daniela Stock and Carol V. Robinson (2011). Mass spectrometry of intact V-type ATPases reveals bound lipids and the effects of nucleotide binding. ***Science***, 334, pages 380-385. PMID: 22021858
- Zacariah L. Hildenbrand, Sudheer K. Molugu, Nadia Herrera, Citlally Ramirez, Chuan Xiao and **Ricardo A. Bernal** (2011). Hsp90 can Accommodate the Simultaneous Binding of the FKBP52 and HOP Proteins. **Oncotarget**, Volume 2, No 1-2, Pages 45-58. PMID: 21378414
- Hildenbrand ZL, Molugu SK, Stock D, **Bernal RA** (2010) The C-H Peripheral Stalk Base: A Novel Component in V_1-ATPase Assembly. **PLoS ONE** 5(9): PMID: 20838636
- Hildenbrand, ZL, Molugu, SK, Paul, A., Avila, GA., Herrera, N, Xiao, C, Cox, MB and **Bernal, RA** (2010) High-Yield Expression and Purification of the Hsp90-associated p23, FKBP52, HOP and SGTα proteins. ***Journal of Chromatography B***, PMID: 20829124.
- Lawrence K. Lee, Alastair G. Stewart, Mhairi Donohoe, **Ricardo A. Bernal** & Daniela Stock (2010) "The structure of the peripheral stalk of T. thermophilus H+-ATPase/synthase" **Nature Structure and Molecular Biology**, **17**(3), 373-8. PMID: 20173764
- Filchikov MV, Osmakov DI, Logovskaia LV, Sykilinda NN, Kadykov VA, Kurochkina LP, Mesianzhinov VV, **Bernal RA**, Miroshnikov KA. (2009) Pseudomonas aeruginosa bacteriophage SN: 3D-reconstruction of the capsid and identification of surface proteins by electron microscopy. **Bioorg Khim**. **35**(6), 808-15. PMID: 20208580
- Esteban, O., **Bernal, R.A.**, Donohoe,M., Videler, H., Sharon, M., Robinson, C.V., and Stock, D. (2007) Stoichiometry and localisation of the stator subunits E and G in T. thermophilus H+ ATPase/synthase. **J. Biol. Chem.** **283**(5), 2595-603. PMID: 18055467
- Schäfer, I., Bailer, S.M., Düser, M.G., Börsch, M., **Bernal, R.A**., Stock, D., and Grüber, G. (2006) Crystal structure of the archaeal A_1A_o ATP synthase subunit B from *Methanosarcina mazei Gö1*: Implications of nucleotide-binding differences in the major A_1A_o subunits A and B. **J. Mol. Biol. 358, 725-740.** PMID: 16563431
- Makyio, H., Iino, R., Ikeda, C, Imamura, H., Tamakoshi, M., Iwata, M., Stock, D., **Bernal, R.A**., Yoshida, M., Yokoyama, K. and Iwata, S. (2005) Structure of a central stalk subunit F of the V-type ATPase/synthase from *Thermus thermophilus*. **EMBO J. 24, 3974-83**. PMID: 16281059
- **Bernal, R.A.** and Stock, D. (2004) Three Dimensional Structure of the Intact *Thermus thermophilus* H^+-ATPase/Synthase by Electron Microscopy. **Structure, 12, 1789-1798.** PMID: 15458628

- **Bernal, R.A.**, Hafenstein, S., Esmeralda, R.,Fane, B.A., and Rossmann, M.G. (2004). The ϕX174 Protein J Mediates DNA Packaging and Viral Attachment to Host Cells. **J. Mol. Biol., 337, 1109-1122**. PMID: 15046981 ⁕ Includes Journal cover
- **Bernal, R.A.**, Hafenstein, S., Olson, N.H., Bowman, V.D, Chipman, P.R., Baker, T.S., Fane, B.A., and Rossmann, M.G. (2003). Structural Studies of Bacteriophage α-3 Assembly. **J. Mol. Biol., 325, 11-24.** PMID: 12473449 ⁕ Includes Journal cover
- Rossmann, M.G., **Bernal, R.A.**, and Pletnev, S. (2001). Combining Electron Microscopic With X-Ray Crystallographic Structures. **J. Struct. Biol. 136, 190-200**. PMID: 12051899
- Dokland, T., **Bernal, R.A.**, Burch, A., Pletnev, S., Fane, B., and Rossmann, M.G. (1999). The role of scaffolding proteins in the assembly of the small, single stranded DNA virus φx174. **J. Mol. Biol., 288, 595-608.** PMID: 10329166
- Wojnowski L, **Bernal R**, Park CM, Handel MA, Hollander WF and Zimmer A. (1998). Reduced activity of BRAF protein kinase in hop and hop(hpy) mouse mutants. **Mamm. Genome, 9, 905-906**. PMID: 9799843
- Wojnowski, L., Zimmer, A.M., Beck, T.W., Hahn, H., **Bernal, R.**, Rapp, U.R., and Zimmer, A. (1997). Endothelial apoptosis in B-raf deficient mice. **Nature Genetics, 16, 293-297**. PMID: 9207797
- Sithanandam, G., Latif, F., Duh, F.M., **Bernal, R.A.**, Smola, U., Li, H., Kuzmin, I., Wixler, V., Geil, L., Shrestha, S., Lloyd, P.A., Bader, S., Sekido, Y., Tartof, K.D., Kashuba, V.I., Zabarovsky, E.R., Dean, M., Rapp, U.R., Klein, G., Zbar, B., Lerman, M., Minna, J., and Allikmets, R. (1996). 3pK, a new mitogen-activated protein kinase-activated protein kinase located in the small cell lung cancer tumor suppressor gene region. **Mol. Cell. Biol., 16, number 3, 868-876**. PMID: 8622688
- Muganda, P., Fischer, A., and **Bernal, R.A.** (1994). Identification of a casein kinase activity found elevated in human cytomegalovirus transformed cells. **Biochem. Biophys. Res. Comm., 207, 740-746.** PMID: 7864867

Invited Articles:

- **Bernal, R.A.** (2008) 2006 article (listed below) was reprinted in the Spring 2008 edition of the Purdue University BioNews newsletter.
- **Bernal, R.A.** (2006) Have Ph.D., Will Travel: Choosing an International Postdoc. Invited feature article in the Postdoc and Beyond section of SACNAS News. **9**, 20-23.

Invited Seminars:

- **Bernal, RA** (2017) Proteins that fold other proteins. Oral presentation to MARC students, New Mexico State University, Las Cruces, New Mexico, February 14, 2017.
- **Bernal, RA** (2016) Proteins that fold other proteins. Oral presentation, **MARC retreat**, The Lodge, Cloudcroft, New Mexico, May 16, 2016.
- **Bernal, R.A.** (2015) Ring separation highlights the protein folding mechanism used by the phage EL encoded chaperonin. **Texas Protein Folders and Function Meeting**. April 10-12, 2015.
- **Bernal, R.A.** (2014) Novel chaperonin protein folding mechanism*. Internal Seminar,* **UTEP Chemical Biology and Drug Development Symposium.** October 10, 2014.

- **Bernal, R.A.** (2013) Recent Alzheimer's Breakthrough: Cure or Hype? *Internal Seminar,* **UTEP Chemistry Department***.* October 18, 2013.
- **Bernal, R.A.** (2011) 3-D Structure Determination of Macromolecular Complexes that Utilize ATP. *Internal Seminar,* **UTEP Chemistry Department***.*
- **Bernal, R.A.** (2011) Structural Studies of Macromolecular Complexes that Utilize ATP*. Invited Seminar* **Our Lady of the Lake University**, San Antonio, Texas, April 8, 2011.
- **Bernal, R.A.** (2010) Structural Studies of Macromolecular Complexes that Utilize. *Invited Seminar* **University of Kansas**, Lawrence, Kansas. September 20, 2010.
- **Bernal, R.A.** (2009) Cryo-EM Reconstructions of a Virus Encoded Chaperonin Point to a Unique Protein Folding Mechanism. *Invited Seminar* **18th Evergreen International Phage Biology Meeting**, Olympia, Washington. August 11, 2009.
- **Bernal, R.A.** (2009) Structure, Function, and Regulation of ATP Utilizing Enzymes. **Oak Ridge National Lab**, Center for Structural Biology. Oak Ridge, Tennessee. July 15, 2009.
- **Bernal, R.A.** (2007) Three dimensional structure of the *Thermus thermophilus* ATP synthase by electron microscopy. *Invited Seminar*, Department of Biological Sciences, **Purdue University**, West Lafayette, IN, February 27, 2007.
- **Bernal, R.A.** (2006) Deciphering the three dimensional structure of the *Thermus thermophilus* ATP synthase using electron microscopy. *Invited Seminar*, The Wellcome Trust Centre for Human Genetics, Division of Structural Biology, **University of Oxford**, July 27, 2006.
- **Bernal, R.A.** (2005) Three dimensional structure of the *Thermus thermophilus* ATP synthase by electron microscopy. *Invited Seminar*, Laboratory of Molecular Bioengineering, **Russian Academy of Sciences**, Moscow, Russia. November, 2005.

Student Abstracts, Posters and Oral Presentations:

- Wang, J., and **Bernal, RA** (2017) A Point Mutation that Leads to a Human Neurodegenerative Disorder Destabilizes the Heat Shock Protein 60 Chaperonin. Poster, 25th Texas Protein Folders and Function Meeting, Cleveland, TX, April 7-9, 2017
- Enriquez, A., and **Bernal, RA** (2017) The Human Mitochondrial Chaperonin: It Takes Two Single-Rings to Tango. Poster, 25th Texas Protein Folders and Function Meeting, Cleveland, TX, April 7-9, 2017.
- Li, J. and **Bernal, R.A.** (2017) Structure and Biological Activity of a D3G Mutation in the Human Mitochondrial hsp60 Chaperonin. Poster, 25th Texas Protein Folders and Function Meeting, Cleveland, TX, April 7-9, 2017.
- Orta, A.K. and **Bernal, R.A.** (2017) Structural Significance of the R136W Point Mutation in hsp27 that Leads to Neurodegenerative Disease. Poster, 25th Texas Protein Folders and Function Meeting, Cleveland, TX, April 7-9, 2017.
- Rojo, H.M. and **Bernal, R.A.** (2017) Point Mutation Leads to Inhibition of a Crucial Ring Separation Step in Protein Folding Mechanism of Viral Chaperonin φEL. Poster, 25th Texas Protein Folders and Function Meeting, Cleveland, TX, April 7-9, 2017.
- Villalobos, J., and **Bernal, R.A.** (2017) The Activity of Phosphorylated and Non-phosphorylated hsp27 Involved in Charcot-Marie-Tooth Disease. Poster, 25th Texas Protein Folders and Function Meeting, Cleveland, TX, April 7-9, 2017.

- Villalobos, J, and **Bernal, RA** (2016) The Structure and Activity of Heat Shock Protein 27 and an S135F Mutation that Leads to a Neurodegenerative Disorder. Poster, Graduate Student Research Expo, The University of Texas at El Paso, November 11, 2016. ***3rd Place Poster Award***
- Wang, J., and **Bernal, RA** (2016) A Point Mutation that Leads to a Human Neurodegenerative Disorder Destabilizes the Heat Shock Protein 60 Chaperonin. Oral Presentation, Graduate Student Research Expo, The University of Texas at El Paso, November 11, 2016.
- Li, J, and **Bernal, RA** (2016) Structure and Biological Activity of a D3G mutation in the Human Mitochondrial Hsp60 Chaperonin. Oral Presentation, Graduate Student Research Expo, The University of Texas at El Paso, November 11, 2016.
- Rojo, H.M., and **Bernal, RA** (2016) Point mutation leads to Inhibition of a Crucial Ring Separation step in protein folding mechanism of viral chaperonin φEL. Oral Presentation, Graduate Student Research Expo, The University of Texas at El Paso, November 11, 2016.
- Rodriguez, A, Martinez, ZS, Castro, E, Echegoyen, L, Llano, M, and **Bernal, RA** (2016) Inhibitory Role of F15 Fullerene in HIV-1 Maturation. Poster, Graduate Student Research Expo, The University of Texas at El Paso, November 11, 2016.
- Holguin, BA, Villalobos, J, Rodriguez, A, Orta, K, Bhatt, J, and **Bernal, RA** (2016) Mutation in Small Heat-Shock Protein 27 Inhibits Phosphorylation Dependent Chaperone Activity. Poster, Graduate Student Research Expo, The University of Texas at El Paso, November 11, 2016.
- Li, J, and **Bernal, RA** (2016) Structural and Biological Activity Study of D3G Mutant Mitochondrial Chaperonin hsp60. Poster, Cardwell Collaborative T3@C2 Poster Session, The Medical Center of the Americas (MCA) Foundation, October 18, 2016.
- Wang, J, and **Bernal, RA** (2016) Electron Microscope Reconstruction and Atomic Structure Fitting of the Human hsp60 Chaperonin Mutant. Poster, Cardwell Collaborative T3@C2 Poster Session, The Medical Center of the Americas (MCA) Foundation, October 18, 2016.
- Fresquez, J, Rojo, H.M., Enriquez, A.S., Li, J., Wang, J. and **Bernal, RA** (2016) Purification and protein folding activity of human mitochondrial chaperonin Hsp10. Poster, COURI Summer Symposium, The University of Texas at El Paso, August 6, 2016.
- Zhang, YanMin, Rojo, H.M., Enriquez, A.S., Li, J., Wang, J. and **Bernal, RA** (2016) Purification and ATPase activity of human mitochondria chaperonin Hsp60. Poster, COURI Summer Symposium, The University of Texas at El Paso, August 6, 2016.
- Orta, KA and **Bernal, RA** (2016) Structural significance of the R136W point mutation in hsp27 that leads to neurodegenerative disease. Oral presentation, MARC retreat, The Lodge, Cloudcroft, New Mexico, May 16, 2016.
- Li, J., and **Bernal, RA** (2015) Structural and Biological Activity Study of D3G Mutant Mitochondrial Chaperonin hsp60. Poster, Graduate Student Research Expo, The University of Texas at El Paso, November 13, 2015.
- Rojo, HM, and **Bernal, RA** (2015) Protein Refolding Activity of the Viral Encoded Chaperonin φEL. Oral Presentation. Graduate Student Research Expo, The University of Texas at El Paso, November 13, 2015.
- Enriquez, AS, and **Bernal RA** (2015) Structural Investigation into the Human Mitochondrial Chaperonin. Poster, Graduate Student Research Expo, The University of Texas at El Paso, November 13, 2015.
- Rodriguez, A., Enriquez, A., Li, J., Molugu, S.K., **Bernal, R.A.** (2015) Cloning of wild type hsp60 for structure determination. COURI Summer Symposium, The University of Texas at El Paso, August 1, 2015.

- Avila, R., Campos S., and **Bernal, R.A.** (2015) Three--dimensional reconstruction of the HPV16 viral capsid complex. COURI Summer Symposium, The University of Texas at El Paso, August 1, 2015.
- Rojo, H., Avila, R., Molugu, S.K., and **Bernal, R.A.** (2015) Protein refolding activity of the virally encoded chaperonin phi-EL. COURI Summer Symposium, The University of Texas at El Paso, August 1, 2015.
- Clift, A., Enriquez, A.S., Li, J., Molugu, S.K., and **Bernal, R.A.** (2015) Learning biochemical procedures via the cloning of Hsp60 D3G. COURI Summer Symposium, The University of Texas at El Paso, August 1, 2015.
- Villalobos, J., Rojo, H., Ruiz, M., Castro, E., Martinez, Z., Llano, M., Echegoyen, L., and **Bernal, R.A.** (2015) Learning Fundamental Biochemical Procedures by Cloning HIV Protease. COURI Summer Symposium, The University of Texas at El Paso, August 1, 2015.
- Ruiz, M., Castro, E., Martinez, Z., **Bernal, R.A**., Llano, M., and Echegoyen, L. (2015) Water-soluble [70]-fullerene derivatives for anti-HIV properties. COURI Summer Symposium, The University of Texas at El Paso, August 1, 2015.
- Avila R, Hantzopulos S, Monsivais F, Orta K, Rojo H, Brown TP, Molugu SK, and **Bernal RA** (2015) A point mutation in the phi-EL chaperonin alters ring separation and protein folding activity. University of Texas at El Paso COURI Symposium. April 18, 2015.
- Molugu, SK and **Bernal, RA** (2015) Ring separation highlights the protein folding mechanism used by the phage EL encoded chaperonin. Keystone Symposia - Hybrid Methods in Structural Biology. March 4-8, 2015.
- Enriquez, AS and **Bernal, RA** (2015) Human hsp60 expressed in *E. coli* yields fully assembled and functional chaperonin that can be isolated in various conformations. University of Texas at El Paso, Department of Chemistry departmental seminar, March 27th, 2015.
- Brown, TP and **Bernal, R.A**. (2013) Insect Cell Expression and Purification of PTEN -A Tumor Suppressing Lipid Phosphatase. ABRCMS Conference, Nashville, TN. November 15, 2013.
- Brown, T.P., Molugu, S.K., and **Bernal, R.A**. (2012) "Development of a Chaperonin Activity Assay" 2012 West Texas STEM Conference Midland College, TX, October 5-6, 2012.
- Brown, T.P., Molugu, S.K., and **Bernal, R.A**. (2012) "Development of a Chaperonin Activity Assay" 2012 Summer COURI Symposium University of Texas at El Paso, TX, July 27, 2012.
- Danielle Martinez, Sudheer K. Molugu, & **Ricardo A. Bernal** (2012) "Refolding of the Green Fluorescent Protein by the Φ-EL Chaperonin." 2012 Summer COURI Symposium University of Texas at El Paso, TX, July 27, 2012..
- Sudheer Molugu, Zacariah Hildenbrand, Diana Tafoya, Nadia Herrera, David Morgan, Michael Sherman, Lidiya P. Kurochkina, Vadim V. Mesyanzhinov, Konstantin A. Miroshnikov, **Ricardo A. Bernal,** (2011) A Novel Mechanism of Bacteriophage Encoded φEL Chaperonin. September 21, 2011.
- Herrera, N**.,** Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K., and **Bernal, R.A.** (2011) "Characterization and crystallization of a lysozyme encoded by bacteriophage SN" 2011 HHMI Gilliam Fellows Conference**.** HHMI Conference Center, Chevy Chase, MD, August 9- August 11, 2011.
- Herrera, N**.,** Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K., and **Bernal, R.A.** (2011) "Characterization and crystallization of a lysozyme encoded by bacteriophage SN" 1st Annual COURI Symposium: *Showcasing Emerging Research at the Forefront of Science*. The University of Texas at El Paso, El Paso, TX, April 16, 2011.
- Herrera, N**.,** Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K., and **Bernal, R.A.** (2011) "Characterization and crystallization of a lysozyme encoded by

bacteriophage SN" University of Texas at El Paso Symposium on Infectious Diseases and Health Disparities in a Changing World. The University of Texas at El Paso, El Paso, TX, April 3- April 5, 2011.

- Hildenbrand, Z.L., Molugu, S.K., and **Bernal, R.A.** (2010) The Inhibitory Interactions of the Yeast V_1-ATPase Captured by Cryo-Electron Microscopy. ACS Chemistry Week at UTEP, Graduate poster competition. University of Texas at El Paso, October 20th, 2010.
- Herrera, N., Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K., and **Bernal, R.A**. (2010) Characterization and crystallization of a lysozyme encoded by bacteriophage SN. National SACNAS Conference Anaheim Convention Center, Anaheim, CA, September 29-October 3, 2010.
- Hildenbrand, Z.L., Molugu, S.K., and **Bernal, R.A.** (2010) V_1-ATPase Peripheral Stalk Architecture UTEP Chemistry Department Fall seminar series. University of Texas at El Paso, October 1st, 2010.
- Herrera, N., Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K., and **Bernal, R.A.** (2010) Studies towards the open conformation of the MscL found in *Mycobacterium Tuberculosis.* 4th Annual Research Colloquium Texas Tech Health Sciences Center/ University of Texas at El Paso, TX, May 4-5, 2010.
- Herrera, N., Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K., and **Bernal, R.A.** (2010) Cloning, expression, purification and crystallization of a lysozyme encoded by bacteriophage SN. The MARC/RISE 2010 Symposium. University of Texas at El Paso, TX, April 23, 2010.
- Molugu. S.K., Hildenbrand. Z.L., Natchiar. K.S., Herrera. N., and **Bernal, R.A.** (2010) Cryo-EM reconstruction of the first virus encoded chaperonin in the ATP bound state. Rio Grande Branch Annual Meeting for the American Society for Microbiology – 2010.
- Hildenbrand, Z.L., Molugu, S.K., Herrera, N., Xiao, C., Cox, M.B., and **Bernal, R.A.** (2010) The formation of Hsp90-mediated sub-assemblies: A structural perspective on steroid hormone receptor maturation. Rio Grande Branch Meeting of the American Society of Microbiology. University of Texas at El Paso, February 25th, 2010.

  Herrera, N., Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K.A., **Bernal, R.A.** (2009) Cloning, Expression, Purification and Crystallization of a Lysozyme Encoded by Bacteriphage SN. **1st Place poster** presentation at the Louis Stokes Alliance for Minority Participation Conference, Austin, Texas. September 9-13, 2009.

  Molugu, S.K. Hildenbrand, Z.L., Natchiar, K.S., Sernova, N., Kurochkina, L.P., Herrera, N., Mesyanzhinov, V.V., Miroshnikov, K.A., **Bernal, R.A.** (2009) Cryo-EM Reconstruction of a Bacteriophage Encoded Chaperonin. 18th Evergreen International Phage Biology Meeting, Olympia, Washington. August 9-14, 2009.
- Molugu. S.K., Hildenbrand. Z.L., Natchiar. K.S., Herrera. N., and **Bernal, R.A.** (2009) Cryo-EM reconstruction of the first virus encoded chaperonin in the ATP bound state. South West Regional Meeting – ACS- 2009.
- Hildenbrand, Z.L., Herrera, N., Molugu, S.K., Cox, M.B., and **Bernal, R.A.** (2009) The structural elucidation of Hsp90/p23-mediated specificity for the large immunophilin protein FKBP52. ACS Southwest Regional Meeting. Camino Real, El Paso TX, November 4th, 2009.
- Herrera, N., Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K., and **Bernal, R.A.** (2009) Cloning, expression, purification and crystallization of a lysozyme encoded by bacteriophage SN. ACS Southwest Regional Meeting. Camino Real, El Paso, TX, November 4-7, 2009.
- Herrera, N., Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K., and **Bernal, R.A**. (2009) Cloning, expression, purification and crystallization of a lysozyme encoded by bacteriophage SN. SACNAS National Conference. Sheraton, Dallas, TX, October 15-18, 2009.

- Herrera, N., Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K., and **Bernal, R.A.** 2009 Cloning, expression, purification and crystallization of a lysozyme encoded by bacteriophage SN Louis Stokes Alliance for Minority Participation Summer Research Academy Conference. University of Texas at Austin, September 9-13, 2009.
- Herrera, N., Hildenbrand, Z.L., Molugu, S.K. Mesyanzhinov, V.V., Miroshnikov, K.A., **Bernal, R.A.** (2009) Cloning, Expression, Purification and Crystallization of a Lysozyme Encoded by Bacteriophage SN. 18th Evergreen International Phage Biology Meeting, Olympia, Washington. August 9-14, 2009.
- Herrera, N., Hildenbrand, Z.L., Molugu, S.K., Mesyanzhinov, V.V., Miroshnikov, K.A., **Bernal, R.A.** (2009) Cloning, Expression, Purification and Crystallization of a Lysozyme Encoded by Bacteriphage SN. Poster presentation at the Louis Stokes Alliance for Minority Participation Conference End-of-Summer Symposium, El Paso, Texas. July 31, 2009.
- Hildenbrand, Z.L., Mologu, S.,and **Bernal, R.A.** (2009) The Inhibitory Interactions of the Yeast V_1-ATPase. NSF Joint Annual Meeting. OMNI SHOREHAM, Washington D.C., June 9th, 2009
- Hildenbrand, Z.L., Mologu, S.,and **Bernal, R.A.** (2009) V-ATPase Regulation: The Rotor Stops Here! Hildenbrand, Z.L., Mologu, S.,and Bernal, R.A. UTEP/SACNAS RESEARCH EXPO. **1st place oral presentation prize**. University of Texas at El Paso, April 16th, 2009.
- Molugu, S.K., Hildenbrand, Z.L., Natchiar, K.S., **Bernal, R.A.** (2009) Cryo-EM Reconstruction of First Virus Encoded Chaperonin. **Second place award** for poster presentation at the UTEP SACNAS Chapter Annual Research Expo, El Paso, Texas. April 16, 2009
- Hildenbrand, Z.L., Molugu, S.K., Stock, D. and **Bernal, R.A.** (2008) Enzyme Stabilization and Regulation of the V-ATPase. Oral Presentation, NCMI Workshop on Single Particle Reconstruction, Map Interpretation and Visualization, December 10-13, 2008. University of Houston, Baylor College of Medicine.
- Maxim V. Filchikov, Artem .I. Domashin, Nina .N. Sykilinda , Oleg V. Chertkov, Rob Lavigne, **Ricardo A. Bernal**, Konstantin A. Miroshnikov. (2008) Comparative genomics and capsid EM-Reconstruction of a YuA-like and KMV-like bacteriophages of *Pseudomonas aeruginosa*. Presented at "Phage Biology, Ecology, Therapy Conference" June 12-17, 2008 at the George Eliava Institute, Tbilisi, Republic of Georgia.
- Molugu, S., Natchiar, K., Hildenbrand, Z.L. and **Bernal R.A.** (2008) Structure determination of the first virus encoded chaperonin. Poster, SACNAS UTEP Chapter Science Symposium, El Paso, TX.
- Hildenbrand, Z.L., Molugu, S., and **Bernal R.A.** (2008) The Three-Dimensional Reconstruction of Yeast V1-ATPase using Cryo-Electron Microscopy. Poster, SACNAS UTEP Chapter Science Symposium, El Paso, Texas.
- Molugu, S., Nagula, S. and **Bernal R.A.** (2007) Structure determination of the first virus encoded chaperonin. Poster, SACNAS UTEP Chapter Science Symposium, El Paso, Texas.
- Molugu, S.K. and **Bernal R.A.** (2007) Structure determination of the first virus encoded chaperonin. Poster, UTEP Bioinformatics Symposium, El Paso, Texas.
- **Bernal, R.A.** and Stock, D. (2004) Three dimensional structure of the *Thermus thermophilus* ATP synthase by electron microscopy. *Seminar*, Structural Studies Colloquia. MRC-Laboratory of Molecular Biology, Cambridge, England, June 24, 2004.
- **Bernal, R.A.** and Stock, D. (2004) Three dimensional glimpse at a bacterial V-ATPase. *Poster*, Structural Analysis of Supramolecular Assemblies by Hybrid Methods. Lake Tahoe, California. March 17-20, 2004.
- **Bernal, R.A.** (2003) Negative stain reconstruction of a bacterial V-ATPase. *Seminar*, EMBO practical course on image processing for cryo-electron microscopy. Birkbeck College, London, U.K. September 10-17, 2003.

- **Bernal, R.A.** (2001) *Session Chair*: Virus Assembly session I. Conference on Virus and Phage Assembly, Helsinki, Finland, June 30-July 5, 2001.
- **Bernal, R.A.**, Burch, A., Hafenstein, S., Fane, B., and Rossmann, M.G. (2001) Bacteriophage α-3 Morphogenesis. *Seminar*, Conference on Virus and Phage Assembly, Helsinki, Finland, June 30-July 5, 2001.
- **Bernal, R.A.**, Burch, A., Hafenstein, S., Fane, B., and Rossmann, M.G. (2000) Structural analysis of bacteriophage α-3 morphogenesis. *Seminar*, Sixth annual Purdue University Biophysics and Cell Biology Symposium. West Lafayette, Indiana, December 1-2, 2000.
- **Bernal, R.A.**, Burch, A., Hafenstein, S., Fane, B., and Rossmann, M.G. (2000) Bacteriophage α-3 Morphogenesis. *Seminar*, Society for the Advancement of Chicanos and Native Americans in Science, Atlanta, Georgia, October 12-15, 2000.
- **Bernal, R.A.**, Burch, A., Hafenstein, S., Fane, B., and Rossmann, M.G. (2000) Microviridae morphogenesis as described by the X-ray structure of the bacteriophage α-3 virion and Cryo-EM reconstruction of the α-3 procapsid. *Poster*, FASEB 2000 Summer Research Virus Assembly Conference, Saxton's River, Vermont, June 10-15, 2000.
- **Bernal, R.A.**, Burch, A., Hafenstein, S., Fane, B., and Rossmann, M.G. (1999) Preliminary structure determination of the bacteriophage α-3. *Seminar*, Society for the Advancement of Chicanos and Native Americans in Science, Portland, Oregon, October 12-15, 1999.
- **Bernal, R.A.** (1999) *Session Chair*: Portals and Entry. Conference on Virus and Phage Assembly, Rio Rico, Arizona, June 8-13, 1999.
- **Bernal, R.A.**, Burch, A., Fane, B., and Rossmann, M.G. (1999) Preliminary investigation of the bacteriophage α-3 crystal structure. *Seminar*, Conference on Virus and Phage Assembly, Rio Rico, Arizona, June 8-13, 1999.
- Allikmets, R, Sithanandam, G., Latif, F., **Bernal, R.A.**, Duh, F.M., Smola, U., Li, H., Kuzmin, I., Wixler,V., Geil, L., Shrestha, S., Lloyd, P.A., Bader, S., Sekido, Y., Tartof, K.D., Kashuba, V.I., Zabarovsky, E.R., Dean, M., Rapp, U.R., Klein, G., Zbar, B., Lerman, M., Minna, J (1995) 3pK, a new MAP kinase activated protein kinase, located in the small cell lung cancer tumor suppressor gene region. Poster, Hood College Oncogene Meeting, Frederick, Maryland.
- Muganda, P., Hernandez, J. **Bernal, R.A.** and Gameros, O. (1993) Relationship of the cellular protein p53 to human cytomegalovirus DNA synthesis. Poster presentation, American Society for Microbiology, Atlanta, Georgia, May 16-20, 1993.
- **Bernal, R.A.**, Fisher, A. and Muganda, P. (1993) Characterization and identification of a casein kinase activity extracted from cells transformed by human cytomegalovirus. *Poster*, American Society for Microbiology, Atlanta, Georgia, May 16-20, 1993.
- Hernandez, J., **Bernal, R.**, Gameros, O. and Muganda, P. (1993) Relationship of the cellular protein p53 to human cytomegalovirus DNA synthesis. Abstract and poster presentation, Undergraduate Research Symposia at The University of Texas Medical Branch at Galveston, Galveston, Texas, Feb. 4, 1993.
- **Bernal, R.A.**, Fisher, A. and Muganda, P. (1993) Characterization and identification of a casein kinase activity extracted from cells transformed by human cytomegalovirus. *Seminar*, Undergraduate Research Symposia at The University of Texas Medical Branch at Galveston, Galveston Texas, Feb. 4, 1993.
- **Bernal, R.A.**, Fisher, A. and Muganda, P. (1993) Characterization and identification of a casein kinase activity extracted from cells transformed by human cytomegalovirus. *Poster*, Society for the Advancement of Chicanos and Native Americans in Science, Albuquerque, NM, Jan.14, 1993.
- **Bernal, R.A.**, Fisher, A., Molina, A., Hernandez and Muganda, P. (1992) Purification and properties of a casein kinase activity from a human cytomegalovirus transformed cell line. *Poster*, American Society for Microbiology, New Orleans, Louisiana, May 26-30, 1992.

Research Funding: (I have brought in $2,447,954.00 since arriving at UTEP)

Past:

- Welch Foundation Grant - Award #AH-1649 (Awarded $180,000), June 1, 2013 - May 31, 2016. “Biochemical and biophysical investigation of a novel protein folding mechanism”. Principle Investigator.

- National Science Foundation – Award #0923437 Major Research Instrumentation Grant (Awarded $1,259,954). September 1, 2009-August 31, 2012. MRI: Acquisition of a Field Emission Gun Transmission Electron Microscope for Biological Structure Determination. Principle Investigator.
- Welch Foundation Grant - Award #AH-1649 (Awarded $160,000), June 1, 2010 - May 31, 2013. “Elucidation of a Novel Mechanism used by a Virus Encoded Chaperonin”. Principle Investigator.
- Oak Ridge National Lab Faculty Summer Research Program - January 2009 (3 month summer appointment awarded), Oak Ridge, Tennessee. Principle Investigator.
- Oak Ridge National Lab High Flux Isotope Reactor Neutron Beamline Access – July 2009 (beam access). Principle Investigator.
- Advanced Photon Source Synchrotron, Argonne Labs, Chicago, IL (for synchrotron data collection time). Awarded, 24 hours in October 2008 and 48 hours in December 2008. Principle Investigator.
- Welch Foundation Grant - Award #AH-1649 (Awarded $150,000), June 1, 2007 – May 31, 2010. “Structure determination of the first virus encoded chaperonin.” Principle Investigator.
- UTEP University Research Institute grant (Awarded $5,025 for 1 yr). November 2006 “Crystallization of the yeast V-type ATPase catalytic component”. Principle Investigator.

Current:

- Welch Foundation Grant - Award #AH-1649 (Awarded $180,000), June 1, 2016 - May 31, 2019. “Deciphering the Structural and Functional Basis for Ring Separation in Chaperonins”. Principle Investigator.
- National Institutes of Health (NIGMS) – Award # SC3GM113805 (Awarded $453,000). April 1, 2015 – March 31, 2019. “Structural Significance of Point Mutations within the Human hsp60 Chaperonin”. Principle Investigator.

Pending:

- National Science Foundation – Division of Molecular and Cellular Biosciences ($966,588) June 1, 2016 – May 31, 2022 “Characterization of Protein Folding Intermediates from a Novel Chaperonin”. Principle Investigator.

Service Activities

Community Service

- Science Fair Poster Judge for the UTEP CHAPTER of SACNAS – April 20, 2007
- BioInformatics Science Fair Poster Judge - November 2006

- Science Fair Poster Judge for the UTEP CHAPTER of SACNAS – April 20, 2008
- EPISD Science Fair Judge for Amber Harris, January 16, 2009.
- UTEP Campus Office of Undergraduate Research Initiatives Research Symposium Poster Judge, August 2, 2014.
- UTEP Campus Office of Undergraduate Research Initiatives Research Symposium Poster Judge, April 18, 2015.

Department Service

- Search Committee member for new Structural Biochemist (2007)
- Departmental Website Redesign and Maintenance (2007-present)
- Maintain Departmental email lists (ChemDept, ChemFaculty, ChemGradStudent, ChemResStaff, ChemStaff)
- Departmental Brochure Graphic Design and Printing (2010-present)
- Department of Chemistry Committee on Pre-Commencement Awards. (December 2010 - 2012).
- Chemistry Representative to Library, Chemistry Department Library liaison. (January 2010 - present).
- Chemistry Department Graduate Admissions Committee Member (January 2012 – May 2016)
- Physical Chemistry Search Committee Member (October 2014 - March 2015)
- PREM Internal Advisory Committee member (September 2012 - May 2016)

College Service & University

- Biochemistry Student Association Faculty Mentor (January 2013 – Present)
- College of Science Dean Search Committee Member (December 2012)
- College of Science Representative in Faculty Senate Committee on Information Technology. (January 2010 - 2012).
- College of Science Representative in Faculty Senate Committee on Academic Policy. (January 2012 - present).
- Advisory Committee on Graduate Education, Committee Member (March 28, 2012)
- College of Science Associate Dean for Research Search Committee Member (November 2014-March 2015).
- Will become Director of MARC program at UTEP when Keith Pannell retires.

Professional Service

- NSF Course, Curriculum, and Laboratory Improvement (CCLI) grant review panel Washington, D.C. (July 11-13, 2007)
- NSF Course, Curriculum, and Laboratory Improvement (CCLI) grant review panel Washington, D.C. (July 9-11, 2008).
- NSF Experimental and Physical Chemistry grant review panel, Washington, D.C. (March 12-13, 2009).
- NSF-MRI grant review panel, Washington, DC (July 17-18, 2010)
- NSF-MRI grant review panel, Washington, DC (April 28-29, 2011)
- NSF-MRI grant review panel, Washington, DC (April 19-20, 2012)
- NSF-MRI grant review panel, Washington, DC (April 25-26, 2013)
- NSF-MRI grant review panel, Washington, DC (May 5-6, 2016)
- NSF-MRI grant review panel, Washington, DC (May 4-5, 2017)
- NSF-Advances in BioInformatics grant review panel, Washington, DC (December 7-9, 2016)

- Argonne National Lab Advanced Photon Source Ad-Hoc Proposal Reviewer (August 2008 – present) > 50 proposals reviewed to date.
- Ad hoc reviewer for various journals (2013-present)

Teaching

Year	Semest	Course	Number	Description	Enrollment	Credits
2006	Fall	CHEM	5195	Graduate Seminar	24	1
2007	Spring	CHEM	4332	Biochemistry Dynamics & Information	72	3
2007	Spring	CHEM	5339	Contemporary Topics in Biochemistry	15	3
2007	Spring	CHEM	6339	Contemporary Topics in Biochemistry	2	3
2007	Spring	CHEM	6396	Graduate Research in Chemistry	1	3
2007	Summer	CHEM	5396	Graduate Research in Chemistry	1	3
2007	Fall	CHEM	1306	General Chemistry II	58	3
2007	Fall	CHEM	6396	Graduate Research in Chemistry	1	3
2008	Spring	CHEM	4332	Biochemistry Dynamics & Information	78	3
2008	Spring	CHEM	5339	Contemporary Topics in Biochemistry	6	3
2008	Spring	CHEM	5396	Graduate Research in Chemistry	1	3
2008	Spring	CHEM	6196	Graduate Research in Chemistry	1	1
2008	Spring	CHEM	6196	Graduate Research in Chemistry	1	1
2008	Spring	CHEM	6339	Contemporary Topics in Biochemistry	4	3
2008	Spring	CHEM	6396	Graduate Research in Chemistry	2	3
2008	Summer	CHEM	6396	Graduate Research in Chemistry	2	3
2008	Fall	CHEM	4330	Biochemistry Dynamics & Information	146	3
2008	Fall	CHEM	6396	Graduate Research in Chemistry	1	3
2008	Fall	CHEM	6396	Graduate Research in Chemistry	1	3
2008	Fall	CHEM	6396	Graduate Research in Chemistry	2	3
2009	Spring	BINF	5111	Seminar for Bioinformatics	5	1
2009	Spring	BINF	5341	Analysis and Modeling of Biostructures	6	3
2009	Spring	CHEM	5339	Contemporary Topics in Biochemistry	7	3
2009	Spring	CHEM	5341	Analysis and Modeling of Biostructures	2	3
2009	Spring	CHEM	6195	Graduate Seminar	3	1
2009	Spring	CHEM	6196	Graduate Research in Chemistry	1	1
2009	Spring	CHEM	6396	Graduate Research in Chemistry	2	3
2009	Summer	CHEM	6396	Graduate Research in Chemistry	1	3
2009	Summer	CHEM	6396	Graduate Research in Chemistry	2	3
2009	Fall	CHEM	6396	Graduate Research in Chemistry	2	3
2009	Fall	CHEM	6396	Graduate Research in Chemistry	2	3
2010	Spring	CHEM	5341	Analysis and Modeling of Biostructures	8	3
2010	Spring	CHEM	4330	Biochemistry Dynamics & Information	67	3
2010	Spring	CHEM	5339	Contemporary Topics in Biochemistry	3	3
2010	Spring	CHEM	6339	Contemporary Topics in Biochemistry	1	3
2010	Spring	CHEM	6396	Graduate Research in Chemistry	1	3
2010	Spring	CHEM	6398	Dissertation	2	3
2010	Summer	CHEM	4176	Introduction to Research	1	1
2010	Summer	CHEM	4376	Introduction to Research	1	3
2010	Summer	CHEM	5399	Thesis	1	3
2010	Summer	CHEM	6396	Graduate Research in Chemistry	2	3
2010	Fall	CHEM	4376	Introduction to Research	1	3

2010	Fall	CHEM	6195	Graduate Seminar	6	1
2010	Fall	CHEM	6399	Dissertation	2	3
2010	Fall	HON	4395	Honors Senior Thesis	1	3
2011	Spring	BINF	5111	Seminar for Bioinformatics	7	1
2011	Spring	BINF	5341	Analysis and Modeling of Biostructures	9	3
2011	Spring	CHEM	3330	Biochemistry I Structure and Function	71	3
2011	Spring	CHEM	4134	Structural Biochemistry Lab	3	1
2011	Spring	CHEM	4334	Structural Biochemistry	3	3
2011	Spring	CHEM	4376	Introduction to Research	1	3
2011	Spring	CHEM	5339	Contemporary Topics in Biochemistry	5	3
2011	Spring	CHEM	6339	Contemporary Topics in Biochemistry	5	3
2011	Spring	CHEM	6399	Dissertation	1	3
2011	Spring	HON	4396	Honors Senior Thesis	1	3
2011	Summer	CHEM	1306	General Chemistry II	106	3
2011	Summer	CHEM	1306	General Chemistry II Workshop	12	3
2011	Summer	CHEM	1306	General Chemistry II Workshop	14	3
2011	Summer	CHEM	1306	General Chemistry II Workshop	14	3
2011	Summer	CHEM	1306	General Chemistry II Workshop	14	3
2011	Summer	CHEM	1306	General Chemistry II Workshop	14	3
2011	Summer	CHEM	1306	General Chemistry II Workshop	16	3
2011	Summer	CHEM	1306	General Chemistry II Workshop	9	3
2011	Summer	CHEM	1306	General Chemistry II Workshop	14	3
2011	Summer	CHEM	3330	Biochemistry I Structure and Function	15	3
2011	Summer	CHEM	6396	Graduate Research in Chemistry	1	3
2011	Fall	CHEM	5196	Graduate Research in Chemistry	1	1
2011	Fall	CHEM	5196	Graduate Research in Chemistry	1	1
2011	Fall	CHEM	6196	Graduate Research in Chemistry	1	1
2011	Fall	CHEM	6196	Graduate Research in Chemistry	1	1
2012	Spring	CHEM	3330	Biochemistry I Structure and Function	149	3
2012	Spring	CHEM	4176	Introduction to Research	1	1
2012	Spring	CHEM	5339	Contemporary Topics in Biochemistry	3	3
2012	Spring	CHEM	6339	Contemporary Topics in Biochemistry	4	3
2012	Spring	CHEM	6196	Graduate Research in Chemistry	1	1
2012	Summer	CHEM	6396	Graduate Research in Chemistry	1	3
2012	Fall	CHEM	3131	Biochemistry Lab	15	1
2012	Fall	CHEM	3131	Biochemistry Lab	11	1
2012	Fall	CHEM	3332	Biochemistry 2 Bioenergetics & Metabolism	19	3
2012	Fall	CHEM	4176	Introduction to Research	2	1
2012	Fall	CHEM	4376	Introduction to Research	2	3
2012	Fall	CHEM	5369	Contemp Topics Inorganic Chem	7	3
2012	Fall	CHEM	6196	Graduate Research in Chemistry	4	1
2012	Fall	CHEM	6331	Advanced Biochemistry	11	3
2012	Fall	CHEM	6396	Graduate Research in Chemistry	1	3
2013	Spring	CHEM	3330	Biochemistry I Structure and Function	175	3
2013	Spring	CHEM	4134	Structural Biochemistry Lab (no TA)	11	1
2013	Spring	CHEM	4176	Introduction to Research	1	1
2013	Spring	CHEM	4334	Structural Biochemistry	11	3
2013	Spring	CHEM	5196	Graduate Research in Chemistry	1	1

2013	Spring	CHEM	6196	Graduate Research in Chemistry	5	1
2013	Spring	CHEM	6396	Graduate Research in Chemistry	1	3
2013	Summer	CHEM	4376	Introduction to Research	1	3
2013	Summer	CHEM	5396	Graduate Research in Chemistry	1	3
2013	Summer	CHEM	6196	Graduate Research in Chemistry	1	1
2013	Summer	CHEM	6396	Graduate Research in Chemistry	1	3
2013	Fall	CHEM	3332	Biochemistry 2 Bioenergetics & Metabolism	27	3
2013	Fall	CHEM	4176	Introduction to Research	1	1
2013	Fall	CHEM	5196	Graduate Research in Chemistry	2	1
2013	Fall	CHEM	5339	Contemp Topics in Biochemistry	2	3
2013	Fall	CHEM	6196	Graduate Research in Chemistry	4	1
2013	Fall	CHEM	6339	Contemp Topics in Biochemistry	3	3
2013	Fall	CHEM	6396	Graduate Research in Chemistry	2	3
2014	Spring	CHEM	3330	Biochemistry I Structure and Function	172	3
2014	Spring	CHEM	5196	Graduate Research in Chemistry	2	1
2014	Spring	CHEM	5398	Graduate Thesis	1	3
2014	Spring	CHEM	6196	Graduate Research in Chemistry	1	1
2014	Spring	CHEM	6396	Graduate Research in Chemistry	1	3
2014	Summer	CHEM	5396	Graduate Research in Chemistry	1	3
2014	Summer	CHEM	6398	Graduate Dissertation	1	3
2014	Fall	CHEM	3332	Biochemistry II Bioenergetics & Metabolism	36	3
2014	Fall	CHEM	4176	Introduction to Research	2	1
2014	Fall	CHEM	5196	Graduate Research in Chemistry	2	1
2014	Fall	CHEM	5399	Graduate Thesis	1	3
2014	Fall	CHEM	6331	Advanced Biochemistry	7	3
2014	Fall	CHEM	6396	Graduate Research in Chemistry	2	3
2014	Fall	RSRC	4033	Undergraduate Research	4	0
2015	Spring	CHEM	3330	Biochemistry I Structure and Function	140	3
2015	Spring	CHEM	4134	Structural Biochemistry Lab	21	1
2015	Spring	CHEM	4334	Structural Biochemistry	21	3
2015	Spring	CHEM	4176	Introduction to Research	1	1
2015	Spring	CHEM	4376	Introduction to Research	2	3
2015	Spring	CHEM	5196	Graduate Research in Chemistry	2	1
2015	Spring	CHEM	5398	Graduate Thesis	1	3
2015	Spring	CHEM	6196	Graduate Research in Chemistry	1	1
2015	Spring	CHEM	6396	Graduate Research in Chemistry	1	3
2015	Summer	RSRC	4033	Undergraduate Research	3	0
2015	Summer	CHEM	4176	Introduction to Research	2	1
2015	Summer	CHEM	4376	Introduction to Research	3	3
2015	Summer	CHEM	5396	Graduate Research in Chemistry	1	3
2015	Summer	CHEM	6396	Graduate Research in Chemistry	1	3
2015	Summer	CHEM	6396	Graduate Research in Chemistry	1	3
2015	Fall	RSRC	4033	Undergraduate Research	6	0
2015	Fall	CHEM	4376	Introduction to Research	2	3
2015	Fall	CHEM	5196	Graduate Research in Chemistry	1	1
2015	Fall	CHEM	5196	Graduate Research in Chemistry	1	1
2015	Fall	CHEM	5339	Contemp Topics in Biochemistry	5	3
2015	Fall	CHEM	5398	Thesis	1	3

2015	Fall	CHEM	6196	Graduate Research in Chemistry	1	1
2015	Fall	CHEM	6339	Contemp Topics in Biochemistry	3	3
2015	Fall	CHEM	6396	Graduate Research in Chemistry	1	3
2015	Fall	CHEM	6399	Dissertation	1	3
2016	Spring	CHEM	6196	Graduate Research in Chemistry	1	1
2016	Spring	CHEM	3330	Biochemistry I; Struct & Function	153	3
2016	Spring	CHEM	4033	Undergraduate Research	4	0
2016	Spring	CHEM	4176	Intro to Research	1	1
2016	Spring	CHEM	5196	Graduate Research in Chemistry	4	1
2016	Spring	CHEM	5399	Thesis	1	3
2016	Spring	CHEM	6196	Graduate Research in Chemistry	1	1
2016	Fall	CHEM	6331	Graduate Advanced Biochemistry	14	3
2016	Fall	CHEM	3131	Undergraduate Biochemistry Lab	9	1
2016	Fall	CHEM	3131	Undergraduate Biochemistry Lab	18	1
2016	Fall	CHEM	3131	Undergraduate Biochemistry Lab	18	1
2016	Fall	CHEM	5196	Graduate Research in Chemistry	4	1
2016	Fall	CHEM	5396	Graduate Research in Chemistry	2	3
2016	Fall	CHEM	5398	Thesis	1	3
2016	Fall	CHEM	5399	Thesis	1	3
2016	Fall	CHEM	6196	Graduate Research in Chemistry	2	1
2016	Fall	CHEM	6399	Dissertation	1	3
2016	Fall	CHEM	6399	Dissertation	1	3
2017	Spring	CHEM	6196	Graduate Research in Chemistry	2	1
2017	Spring	CHEM	3131	Undergraduate Biochemistry Lab	15	1
2017	Spring	CHEM	3131	Undergraduate Biochemistry Lab	13	1
2017	Spring	CHEM	4334	Structural Biochemistry	23	3
2017	Spring	CHEM	4134	Structural Biochemistry Lab	23	1
2017	Spring	CHEM	5196	Graduate Research in Chemistry	8	1
2017	Spring	CHEM	5396	Graduate Research in Chemistry	2	3
2017	Spring	CHEM	5398	Thesis	1	3
2017	Spring	CHEM	5399	Thesis	1	3
2017	Spring	CHEM	6196	Graduate Research in Chemistry	2	3
2017	Spring	CHEM	6396	Graduate Research in Chemistry	1	1
2017	Spring	CHEM	6398	Graduate Research in Chemistry	1	1