

Maurice Brookhart

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1. Personal

105 Rocky Point Court
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2. Education

1968, Ph. D., University of California, Los Angeles, Physical Organic Chemistry, S. Winstein, thesis Advisor
1964, B. A., Johns Hopkins University

3. Professional Experience

1990 - present - W.R. Kenan, Jr., Professor, University of North Carolina at Chapel Hill
1978-1990 – Professor of Chemistry, University of North Carolina at Chapel Hill
1974 - 1978 - Associate Professor, University of North Carolina at Chapel Hill
1968 - 1974 - Assistant Professor, University of North Carolina at Chapel Hill

2003 (Spring) Senior Humboldt Fellow, MPI, Muelheim
2001 (Spring) Senior Humboldt Fellow, Univ. of Marburg
1997 (Spring) Visiting Professor, Instituto de Investigaciones Quimicas, Seville, Spain
1996 (Fall) Visiting Miller Professor of Chemistry, University of California Berkeley
1989 (July) CNRS Institute for Coordination Chemistry, Toulouse, France, Visiting Professor of Chemistry
1989 (June) University of Bordeaux, France, Visiting Professor of Chemistry
1987 (Spring) University of Rennes, France, Visiting Professor of Chemistry
1982-83 University of Oxford, England, Visiting Professor of Chemistry
1981 (Spring) University of Rennes, France, Visiting Professor of Chemistry
1974 (Fall) University of Wisconsin, Visiting Professor of Chemistry
1968-69 - Southampton University, England, NATO postdoctoral fellow
1968 - University of California, Los Angeles, NSF postdoctoral fellow

4. Honors, Memberships and National Service

2010 Willard Gibbs Medal
2008 State of North Carolina Award in Science
2007 ACS Sierra Nevada Section Distinguished Chemist Award
2003 ACS Award in Polymer Chemistry
2002-2006 Chemistry Division Review Committee, Los Alamos National Laboratory
2001 Member, National Academy of Sciences
2001 Senior Humboldt Research Fellowship
2001 Fellow, American Association for the Advancement of Science
2000 Honorary Doctorate, University of Rennes, France
2000 Royal Chemical Society Centenary Lecturer
1998 Charles H. Stone Award (Piedmont Section, ACS)
1997-2001 Medicinal Chemistry Study Section, DRG, NIH

1996 American Academy of Arts and Sciences Fellow
1995 Japan Society for the Promotion of Science (JSPS) Fellowship
1994 ACS A. C. Cope Scholar Award
1992 North Carolina Section ACS Distinguished Speaker Award
1990-1996 Associate Editor, *Organometallics*

5. Publications (May 1, 2011 – April 30, 2012)

- a. Books, including pages
- b. Refereed papers/articles, including pages*

Choi, J., MacArthur, A. H. R., Brookhart, M., Goldman, A. S., “Dehydrogenation and Related Reactions Catalyzed by Iridium Pincer Complexes”, *Chem. Rev.*, **2011**, 1761-1779.

Chen, C., Guironnet, D., Barborak, J., Brookhart, M., “Preparation and characterization of conjugated polymers made by post-polymerization reaction of alternating polyketones”, *J. Am. Chem. Soc.*, **2011**, *133*, 9658-9661.

Findlater, M., Cartwright-Sykes, A., White, P. S., Schauer, C. K., Brookhart, M., “Role of Coordination Geometry in Dictating the Barrier to Hydride Migration in d⁶ Square Pyramidal Iridium and Rhodium Pincer Complexes”, *J. Am. Chem. Soc.*, **2011**, *133*, 12274-12284.

Walter, M. D., White, P. S., Schauer, C. K., Brookhart, M., “The Quest for Stable σ -Methane Complexes: Computational and Experimental Studies”, *New J. Chem.*, **2011**, *35*, 2884-2893.

Chen, Z., Chen, C., Weinberg, D. R., Kang, P., Concepcion, J. J., Harrison, D. P., Brookhart, M., Meyer, T. J., “Electrocatalytic reduction of CO₂ to CO by polypyridyl ruthenium complexes”, *Chem. Commun.*, **2011**, *47*, 12607-12609.

Cochrane, N. A., Brookhart, M. S., Gagné, M. R., “Driving Catalyst Reoxidation in Wacker Cyclizations with Acetal-Based Metal-Hydride Abstractors”, *Organometallics*, **2011**, *30*, 2457-2460.

Park, S., Kim, B. G., Gottker-Schnetmann, I., Brookhart, M., “Redistribution of Trialkyl Silanes Catalyzed by Iridium Silyl Complexes”, *ACS Catal.*, **2012**, *2*, 307-316.

Park, S., Brookhart, M., “Development and Mechanistic Investigation of a Highly Efficient Ir(V) Silyl Complex for the Reduction of Tertiary Amides to Amines”, *J. Am. Chem. Soc.*, **2012**, *134*, 640-653.

Findlater, M., Schultz, D. M., Bernskoetter, W. H., Cartwright-Sykes, A., Heinekey, D. M., Brookhart, M., “Dihydrogen Complexes of Iridium and Rhodium”, *Inorg. Chem.* **2012**, *51*, 4672-4678.

Kang, P., Cheng, C., Chen, Z., Schauer, C. K., Meyer, T. J., Brookhart, M., “Selective Electrocatalytic Reduction of CO₂ to Formate by Water-Stable Iridium Dihydride Pincer Complexes”, *J. Am. Chem. Soc.*, **2012**, *134*, 5500-5503.

- c. Patents
- d. Unrefereed works, including book reviews

6. Seminars and Papers Presented (May 1, 2011 – April 30, 2012)

a. Invited Presentations

i. Address at Major Society, Meeting, or Conference

243rd ACS National Meeting, San Diego, CA, March 25-29, 2012, Symposium in honor of Oleg Ozerov, “Synthesis and Reactivity of New PNP and NNN Rh and Ir Pincer Complexes”, Authors: Chen Cheng, Bong Kim, Alan Goldman, David Wang

ii. Other invited talks to academic and professional audiences

Brown University, Providence, RI, May 6, 2011, “Reactions of Alkanes with Transition Metal Complexes”

Los Alamos National Laboratory, Los Alamos, NM, September 15, 2012, Transition Metal Alkane Chemistry: Alkane Methathesis and Transition Metal Alkane Complexes

Michigan State University, East Lansing, MI, Dow/Karabatsos Lectures, February 6-10, 2012,

1. “Alkane Methathesis: A Route to Tomorrow’s Fuels”
2. “Generation of Transition Metal Alkane Complexes and Related Chemistry”
3. “Catalysis via Iridium Silyl and Silane Complexes”

Worcester Polytechnic Institute, Worcester, MA, April 11, 2012 “Alkane Metathesis: A Route to Tomorrow’s Fuels?”

b. Contributed Papers and Posters

242nd ACS National Meeting, Denver, CO, August 28-September 1, 2011, Paper, “Development of Iridium Pincer Catalysts for Water Oxidation”, Authors: Leah Pranger, Maurice Brookhart, Joseph Templeton

242nd ACS National Meeting, Denver, CO, August 28-September 1, 2011, Paper, “Dehydrogenation and Related Reactions of Alkanes Catalyzed by Pincer-iridium Complexes”, Authors: Alan Goldman, Karsten Krogh-Jespereon, Maurice Brookhart

243rd ACS National Meeting, San Diego, CA, March 25-29, 2012, Paper, “Synthesis of Iridium Pincer Catalysts for Water Oxidation”, Leah Wingard, Peter White, Maurice Brookhart, Joseph Templeton

c. Meetings Attended

CENTC (Center for Enabling New Technologies Through Catalysis) Meeting, Dallas, Texas, May 15-18, 2011

CENTC (Center for Enabling New Technologies Through Catalysis) Meeting, Seattle, WA, Sept. 10-14, 2011

DOE review of EFRC, Charlotte, NC, March 15, 2012

243rd ACS National Meeting, San Diego, CA, March 25-29, 2012

7. Teaching Record (May 1, 2011– April 30, 2012)

a. Course Assignments (list assignments for each semester for the past three years and the number of

students in each course)

Spring 2012 (include number of students)

Chemistry 467 – 35 students

Chemistry 395 – 1 student

Fall 2011 (include number of students)

Chemistry 395 – 1 student

Spring 2011 (include number of students)

Chemistry 467 - 25 students

Chemistry 550L – 80 students

Chemistry 395 – 1 student

Fall, 2010 (include number of students)

Chemistry 395 – 1 student

Spring, 2010 (include number of students)

Chemistry 467 – 18 students

Chemistry 395 – 2 students

Chemistry 262L - 500 students

Fall, 2009 (include number of students)

Chemistry 395 – 2 students

b. Dissertations and Theses (years 2009 – 1998)

i. Ph.D. Dissertations (name, thesis title, degree, year)

Huang, Zheng, “Alkane Metathesis via Tandem Catalysis”, Ph.D. 2009

Urbin, Stephanie, “Reactivity of Cationic (Allyl) Pd(III) Complexes with Olefins and Dienes”, Ph.D., 2009

Yang, Jian, “Iridium-Catalyzed Reduction of C-X Bonds (X=F, Cl, Br, I, O) Bonds with Triethylsilane”, Ph. D. 2008

O’Connor, Abby, “Reactions of Cationic (Allyl)Ni(II) Complexes with 1,3-Dienes and Olefins: Polymerization and Mechanistic Studies, Ph. D. 2008

Doherty, Mark, “Synthesis and Catalytic Reactions of Electrophilic Late Metal Complexes”, Ph.D., 2007

Alison Sykes, “Investigations of C-H and N-H Activation with Electron Deficient Iridium Pincer Complexes”, Ph.D., 2006

Lei Zhang, “Developing Neutral Bidentate (N,O) Nickel(II) Catalysts for Ethylene Homo- and Copolymerization”, Ph. D., 2006

Liu, Weijun, “Olefin Polymerization and Copolymerization Using Cationic Ni(II) and Pd(II) Catalysts: Synthetic and Mechanistic Studies”, Ph. D., 2004

- Jenkins, Jason, "Neutral Nickel(II) Ethylene Polymerization Catalysts: A Synthetic and Mechanistic Study", Ph. D., 2003.
- Leatherman, Mark, "Mechanistic Investigations of Chain Initiation and Isomerization of Olefins: Applications for the Synthesis of New Polymeric Architectures", Ph.D. 2003.
- Malinoski, Jon, "Olefin Polymerization and Oligomerization by Cationic (II) and Pd(II) Complexes Bearing (P,O) Chelating Ligands", Ph.D., 2003
- Taw, Felicia, "Carbon-Hydrogen, Silicon-Hydrogen, and Carbon-Carbon Bond Activation Chemistry Using Cationic Rh(II) Complexes", Ph.D., 2002
- Gottfried, Amy, "Pd(II) α -Diimine Catalysts for the Living and Block Copolymerization of Ethylene and α -Olefins", Ph.D., 2002.
- Shultz, C. Scott, "Mechanistic Investigations of the Nickel(II) and Palladium(II) Catalyzed Copolymerization of Carbon Monoxide and Olefins", Ph.D., 2001
- Shultz, Leigh, "Mechanistic Investigation of the Pd(II)-Catalyzed Polymerization of Olefins", Ph.D., 2001
- Svejda, Steven, "Studies of Olefin Dimerization, Oligomerization, and Polymerization Catalyzed by Cationic (α -Diimine) (II) Complexes, Ph.D., 1999
- Lenges, Christian, "Catalytic Transformations based on Bond Activation Reactions Using Cobalt and Rhodium Complexes, Ph.D., 1999
- Small, Brooke, "A New Generation of Iron and Cobalt Catalysts for the Polymerization of Olefins, Ph.D., 1998
- ii. M.S./M.A. Theses (name, thesis title, degree, year)
- Moorhouse, Rebecca, "Vinyl Addition Polymerization of Norbornene, Norbornene-type Monomers, and Cyclobutene with Cationic (allyl)Ni and Pd(II) Catalysts with Related Mechanistic Studies, M.S. 2008
- Braun, Julia, "Rhodium-Catalyzed Intramolecular Hydrogen Transfer of Alkoxy Vinyl Silanes and *N*-(dimethylvinylsilyl)-amines", M.S. 2005
- DiSalvo, Darren, "Rhodium and Cobalt Catalyzed Transfer Hydrogenation Reactions of Alkoxy Vinyl Silanes", M. S., 2001
- iii. Undergraduate Honors Theses (name, thesis title, degree, year)
- Cheng, Chen, "Preparation and characterization of conjugated polymers made by post-polymerization reaction of alternating polyketones", B. S. 2011
- Swisher, Nicholas, "Investigation of Electrophilic Late Transition Metal Complexes", B.S. 2010

Rolfe, Eleanor, "Ir: A New Iridium Pincer Catalyst for Transfer Dehydrogenation and Alkane Metathesis", B. S. 2009

Lunden, Pamela, "Chemistry of Iridium Pincer Complexes", B.S. 2004

Corkey, Britt, "C-H Activation: Electronic Studies on a Cationic Rh(III) Complex", B.S. 2003

c. Research Group

i. Current Group

1. Graduate Students (Name, undergrad. Degree and institution, current year in group)

Cochrane, Nikki, 5th year, North Carolina State University, (Joint with M. Gagne)
Turlington, Christopher, 3rd year, Furman University(Joint with J. L. Templeton)

2. Undergraduate Students (name, current year in group, class, indicate if honors thesis Student)

Kanipe, Katherine, 3rd year, Senior
Bygraves, Laura, 1st year, Junior

3. Postdoctoral Research Associates (name, current year in group, graduate institution)

Kang, Peng, 2nd year, Stanford University
Lyons, Thomas, 2nd year, University of Michigan
Kundu, Sabuj, 1st year, Rutgers, The State University of New Jersey
Bezier, David, 1st year, University of Rennes1, France

4. Temporary Research Assistant, Cheng, Chen, 1st year, B.S. UNC-CH

ii. Former Students (years 2012-1998)

Name (Prior degrees and Institutions, association with group (grad, undergrad, postdoc; dates), UNC degree, activities after UNC)

2008-2012, Park Sehoon, Ph.D., Tokyo Institute of Technology, Japan, post doc, Momentive, Senior Research Chemist

2011-2012, Kim, Bong, Ph. D., visiting scholar, Gyeongsang Univ., Jinju, South Korea, Faculty

2011-2012, Campos, Jesus, visiting scholar, University of Seville, Spain, Ph.D. student

2010-2011, Zhang, Danfeng, Ph. D., visiting scholar, East China University of Science and Technology, researcher

2010-2011, Wagner, Thomas, visiting scholar, Technical University, Munich, Germany, Ph.D. student

2009-2011, Cheng, Chen, undergraduate student, B.S. UNC-CH,

2009-2010, Chapel, Andrew, undergraduate student, B.S. UNC-CH, graduate student at Boston University

- 2009-2011, Guironnet, Damien, Ph. D., Universitat Konstanz, Germany, post doc, BASF, Senior Research Chemist
- 2009-2010, Lowry, Roxy, Ph. D., U. of Florida, post doc, college in Georgia, Mercer University, Assistant Professor
- 2008-2011, Findlater, Michael, Ph. D., U. of Texas, post doc, Texas Tech, Assistant Professor
- 2006-2010, Swisher, Nicholas, undergraduate student, B.S. UNC-CH, graduate student at California Institute of Technology
- 2007-2010, Walter, Marc, Ph.D., University of Kaiserslautern, Germany, Humboldt Postdoctoral Fellow, University of Braunschweig, faculty
- 2009-2010, Li, Liuzhong, B.S., Shandong University, researcher, Research Institute of Qilu Branch Co. SINOPEC, researcher
- 2007-2009, Bernskoettker, Wesley, Ph.D., Cornell U., post doc, Brown Univ., Assistant Professor
- 2007-2009, Lalehzari, Azadeh, Ph.D., Kansas State University, post doc, employed outside Chemistry
- 2006-2007, Moorehouse, Rebecca, B.S. Vanderbilt University, graduate student, M.S., UNC-CH, Bruker Instruments, Technical Sales
- 2005-2007, Carson, Emily, Ph.D., MIT, post doc, maternity leave
- 2005-2008, Bolig, Andrew, Ph.D. Colorado State University, post doc, San Francisco State U., Assistant Professor
- 2005-2006, Shiotsuki, Masashi, Kyoto University, Japan, faculty
- 2004-2009, Urbin, Stephanie, B. S. Michigan State University, graduate student, Ph.D., UNC-CH, Proctor & Gamble, Senior Research Chemist
- 2004-2009, Huang, Zheng, B. S., Nankai University, China, graduate student, Ph. D., UNC-CH,
- 2003-2006, MacArthur, Amy, Ph.D., Yale U., post doc, U.S. Naval Academy, Professor
- 2004-2005, Schrekker, Henri, Ph.D. Leibniz-Institute of Plant Biochemistry, Germany, post doc, Federal Univ., Brazil, Professor
- 2004-2005, Pintauer, Thomislav, Ph.D. Carnegie Mellon University, post doc, Duquesne Univ., Professor
- 2003-2008, Yang, Jian, B.S. Fudan University, China, graduate student, Ph.D., UNC-CH, Exxonmobil, Senior Research Chemist

- 2003-2008, O'Connor, Abby, B.S. Lafayette College, graduate student, Ph.D., UNC-CH, College of New Jersey, Assistant Professor
- 2002-2007, Sykes, Alison, B.S. Washington and Lee University, graduate student, Ph.D., UNC-CH, RTI International, Chemistry Consultant
- 2003- 2005, Braun, Julia, B.S. Macalester College, graduate student, M.S. UNC-CH, PhD Veterinary Program
- 2003-2005, Lundin, Pamela, undergraduate student, graduate student at MIT
- 2003-2005, Chomitz, Wayne, undergraduate student, Ph.D. UC-Berkeley, works in San Francisco
- 2002-2006, Zhang, Lei, B.S. Peking University, China, graduate student, Ph.D., UNC-CH, Total Petrochemicals, Senior Research Chemist
- 2002-2007, Doherty, Mark, B. S. Rensselaer Polytechnic Institute, graduate student, Ph.D., UNC-CH, GE, Senior Research Chemist
- 2002-2004, Williams, Scott, Ph.D. The University of Washington, post doc, Claremont College, Assistant Professor
- 2002-2004, Gottker-Schnetmann, Inigo, Ph.D. University of Muenster, Germany, University of Konstanz, post doc
- 2002-2003, Lovisi, Humberto, Ph.D. Federal University of Rio de Janeiro, Brazil, post doc
- 2002-2002, Kotov, Vasily, Ph.D. Moscow State University, Law School
- 2001-2003, Bohm, Volker, Ph.D. Technische Universitat Munchen, Germany, Humboldt Postdoctoral Fellow, BASF, Senior Research Chemist
- 2001-2003, Corkey, Britton, Undergraduate student, B.S., UNC-CH, Ph.D., UC-Berkeley, Gilead Biosciences, Process Chemist
- 2001-2003, Leach, George, Undergraduate student, B.S., UNC-CH
- 2001-2002, Diaz, Maria del Mar, Ph.D. University of Huelva, Spain, post doc, Univ. of Huelva, faculty
- 2000-2005, Liu, Weijun, B. S. Peking University, China, Ph.D., UNC-CH, Molecular Imprints, Senior Research Chemist
- 1999-2001, Prishuber-Pflugl, Peter, Ph.D. Univ. of Technology, Graz, post doc, BASF, Senior Research Chemist
- 1999-2003, Daugulis, Olafs, Ph.D. Univ. of Wisconsin-Madison, post doc, Univ. of Houston, Assistant Professor

- 1999-2001, DiSalvo, Darren, B. S. Fort Lewis College, graduate student, M.S. UNC-CH, Boehringer Ingelheim Company, Chemist
- 1998-2003, Jenkins, Jason, B.S. Cal Tech., graduate student, Ph.D, UNC-CH, Eastman Chemicals, Senior Research Chemist
- 1998-2003, Leatherman, Mark, B. S. University of Delaware, graduate student, Ph.D. UNC-CH, Momentive Performance Materials, Senior Research Chemist
- 1998-2003, Malinoski, Jon, B .S. University of Chicago, graduate student, Ph.D. UNC-CH, Sabic Innovative Plastics, Senior Research Chemist
- 1996-2001, Taw, Felicia, B. S. University of California, Berkeley, Ph.D. UNC-CH, Los Alamos Laboratory, Senior Research Chemist
- 1996-2002, Gottfried, Amy, B. S. Georgia Institute of Technology, Ph.D. UNC-CH, University of Michigan, lecturer
- 1996-2001, Shultz, C. Scott, B. S. Transylvania University, graduate student, Ph.D. UNC-CH, Merck and Company, Senior Research Chemist
- 1996-2001, Shultz, Leigh, B. S. University of Florida, graduate student, Ph.D. UNC-CH, Merck and Company, Senior Research Chemist
- 1996-1999, Svejda, Steven, B.S. and M.S. Utah State U., graduate student, Ph.D. UNC-CH, U. S. Air Force, Senior Research Chemist
- 1995-1999, Lenges, Christian, B.S. Heinrich Heine Universitat, Germany, graduate student, Ph.D. UNC-CH, DuPont, Senior Research Chemist
- 1993-1998, Small, Brooke, B.S. Texas A & M, graduate student, Ph.D. UNC-CH, Chevron Chemical Company, Senior Research Chemist

iii. Awards, Honors, and Special Achievements of Graduate, Postdoctoral, and Undergraduate students.

Cheng, Chen, undergraduate student
Venable Award in Department of Chemistry, 2011

Swisher, Nicholas, undergraduate student
Fulbright Grant-2010-2011-Institute of International Education
GlaxoSmithKline Summer Undergraduate Research Fellowship, 2009
SNYStar Award, Thieme Publishing, 2009
James D. Altom Memorial Award, UNC Chemistry, 2009
James H. Maguire Memorial Award, UNC Chemistry, 2008

Li, Liuzhong, researcher, China Scholarship Council Fellowship, 2009-2010

Walter, Marc, Post doc, Humboldt Fellowship, 2007-2009

Rolfe, Eleanor, undergraduate student, UNC-CH, Dept. of Chemistry Venable Medal, 2009

Lovisi, Humberto, post doc, Brazil, Ministry for Science and Technology Fellowship, 2002-2003

Gottker-Schnetmann, Inigo, post doc, Leopoldina Research Fellowship, 2002-2004

Bohm, Volker, post doc, Humboldt Fellowship, 2001-2003

Diaz, Maria del Mar, post doc, Spain-Department of Education Fellowship, 2001-2002

Braun, Julie, graduate student, Board of Governor's Fellowship, 2003-2005

Leach, George, undergraduate student, David L. Stern Scholars Award & William N. Prichard Scholars Award, 2001-2003

Corkey, Britton, undergraduate student, American Institute of Chemists Student Award and Natural Starch & Chemical Company Student Award, 2001-2003

Jenkins, Jason, graduate student, Venable Graduate Fellowship, 1998-2003

Preishuber-Pflugl, post doc, Austrian Science Foundation Fellowship, 1999-2001

8. Grant Acquisitions

a. Current Extramural Funding (Title, Agency, Project Period, Total Award Amount)

NSF Center for Enabling New Technologies through Catalysis (CENTC), NSF, 08/01/07 – 07/31/12, \$995,237

Metal-Catalyzed Diene and Olefin Polymerizations: Mechanistic Studies and Catalyst Design, NSF, 07/01/10 – 06/30/13, \$560,846

Catalytic CO₂ Reduction-UNC-CH Energy Frontier Research Center, DOE, 08/01/09 – 07/31/12, \$243,702

Conversion of Olefins to Aromatics and Conjugated Dienes, Eastman Chemical Company, 07/08/2011-06/30/2012, \$57,330

b. Proposals Submitted and Pending (Title, Agency, Project Period, Total Award Amount, date submitted): Not applicable

c. Proposals Submitted and Funded: Not applicable

d. Proposals Submitted and not Funded: Not applicable

9. Professional Service (May 1, 2011 – April 30, 2012)

a. Service to discipline (e.g. Reviewing papers/proposals, editorships, editorial boards, advisory boards, departmental reviews, meeting organization, talks/presentations to government officials, public

audiences, schools, etc.)

i. Editorships or Service on Editorial Boards

Organic Letters

Journal of Polymer Science

Advanced Synthesis and Catalysis

ii. Society Memberships

American Chemical Society

American Association for the Advancement of Science

American Academy of Arts and Sciences

National Academy of Sciences

iii. Other (participation in external reviews, etc.)

Member, Executive Committee for NSF-funded Center for Enabling New Technologies Through Catalysis, (CENTC), University of Washington

b. Departmental service (Departmental committees (indicate if chair), departmental proposals, student committees, administrative roles)

i. Permanent

Facilities Committee

Faculty Awards Committee (Chair)

Organic Division Contact Person

Development Committee

ii. Ad hoc (includes search committees)

c. University service (Advisory boards, directorships, committees (indicate if chair), faculty council membership, review of other departments etc.)

10. Research Statement

Not Applicable

11. Teaching Statement

Not Applicable