Department of
CHEMICAL ENGINEERING
COLLEGE OF ENGINEERING | THE UNIVERSITY OF UTAH


## Milind D. Deo

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### Academic Preparation

#### Education

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| June 1981 | B.S. Chemical Engineering, Indian Institute of Technology Madras, India |
| May 1987 | Ph.D., Chemical Engineering, University of Houston, Houston, TX |
| 1987-1989 | Post-Doctoral Fellow, Petroleum Engineering, Stanford University, CA |

#### Other Experience

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| 1986-1987 | Intern and Research Engineer, Schlumberger Perforating Technology, Houston |

### Professional History

#### Academic Leadership (University of Utah)

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| May 2013 to June 2019 | Chair, Department of Chemical Engineering |
| 2006 to 2013 | Associate Dean, College of Engineering |
| June - December 2010 | Acting Chair, Department of Chemical Engineering |

#### Academic Career (University of Utah)

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| 2001 - Present | Professor, Chemical Engineering |
| 1995 - 2001 | Associate Professor, Chemical and Fuels Engineering |
| 1992 - 1995 | Assistant Professor, Chemical and Fuels Engineering |
| 1989 - 1992 | Assistant Professor, Fuels Engineering |

### Awards and Honors

- The College of Engineering Distinguished Service Award – 2019
- SPE Distinguished Lecturer – 2017-18
- AIChE Fellow – Elected 2012
- SPE Reservoir Evaluation and Engineering, Outstanding Technical Editor Award, 2012
- SPE International Outstanding Technical Service Award 2010: Reservoir Characterization and Dynamics – Rocky Mountain Region
- Team member of two U.S. DOE projects: *Monument Butte Waterflood* and *Reactivating an Idle Lease in the Midway Sunset Field*, which received commendations from the Energy Secretary of the United States.

## Research

### Research Highlights

- Graduated 35 Ph.D. students (including co-advisees) and 15 Masters students.
- Authored or co-authored about 100 peer-reviewed publications and 50 full-length conference papers.
- Managed a consistent research program with total research expenditures of over $14 million.
- Worked on research areas spanning fuels production, transportation and processing, carbon dioxide uses and management, flow of complex fluids, and behavior of fluids in nanopores; carbon management research includes carbon capture, supercritical extraction, carbon dioxide enhanced oil recovery and sequestration. Established a comprehensive fuels analytical laboratory.
- Created an ongoing flow-assurance research program on pipeline integrity and reliability of flow.
- Was part of an ARPA-E project for the conversion of methane to liquids (benzene) using a novel reactive separation process

### Grants and Research Awards

About $15 million in research grants and awards.

### Journal Publications and Book Chapters

1. Palash Panja, Brian McPherson and Milind Deo (2022), Techno-Economic Analysis of Amine-based $CO_2$ Capture Technology: Hunter Plant Case Study, *Carbon Capture Science & Technology,* Vol. 3, 2022, 100041.

2. Yidong Xia, Qi Rao, Ahmed Hamed, Joshua Kane, Voktoriya Semeykina, Ila Zharov, Milind Deo and Zhen Li, Flow reduction in pore networks of packed silica nanoparticles: Insights from mesoscopic fluid models, *Langmuir*, 2022, 38, 8135-8152.

3. Pranay Asai, Jiaqi Jin, Milind Deo, Jan D Miller, Darryl Butt (2022), Non-equilibrium molecular dynamics simulation to evaluate the effect of confinement on fluid flow in silica nanopores, *Fuel*, Vol. 317.

4. Jiaqi Jin, Chen-Luh Lin, Shoeleh Assemi, Jan D Miller, Darryl P Butt, Taylor Jordan, Milind D Deo, Viktoriya Semeykina (2022). Nanopore networks in colloidal silica assemblies characterized by XCT for confined fluid flow modeling, *Journal of Petroleum Science and Engineering*, Vol. 208.

5. Qi Rao, Yidong Xia, Jiaoyan Li, Milind Deo, Zhen Li (2021), Flow reduction of hydrocarbon liquid in silica nanochannel: Insight from many-body dissipative particle dynamics simulations. *Journal of Molecular Liquids.* Vol. 344.

6. J Jin, P Asai, X Wang, JD Miller, M Deo, 2021, *Colloids and Surfaces A: Physicochemical and Engineering Aspects*, Volume 626, 5 October 2021, 127032

7. Y Wang, T Henriksen, M Deo, RA Mentzer, 2021, Factors contributing to US chemical plant process safety incidents from 2010 to 2020, *Journal of Loss Prevention in the Process Industries*, Volume 71, July 2021, 104512.

8. P Asai, P Panja, R Velasco, M Deo, 2021, Flow of long chain hydrocarbons through carbon nanotubes (CNTs), *Scientific Reports* volume 11, Article number: 11015 (2021).

9. S Mohammed, H Asgar, M Deo, G Gadikota Interfacial and Confinement-Mediated Organization of Gas Hydrates, Water, Organic Fluids, and Nanoparticles for the Utilization of Subsurface Energy and Geological Resources, *Energy Fuels* 2021, 35, 6, 4687–4710

10. Goral J. and Deo, M.D., 2021, Nanofabrication of synthetic nanoporous geomaterials: from nanoscale-resolution 3D imaging to nano-3D-printed digital (shale) rock, *Scientific Reports,* volume 10, rticle number: 21596 (2020).

11. R. Velasco, P. Panja and Deo, M.D, 2020, Moving boundary approach to forecast tight oil production, AIChE Journal, https://doi.org/10.1002/aic.17012

12. J. Li., Q. Rao, Y. Xia, M. Hoepfner, M. Deo, 2020, Confinement-mediated phase behavior of hydrocarbon fluids: Insights from Monte Carlo Simulations, Langmuir, 36, 26, 7277-7288.

13. Y. Xia, H. Cho, M. Deo, S.H. Risbud. M.H. Bartl and S. Sen, 2020, Layer by Layer Freezing of Nanoconfined Water, Scientific Reports, 10(1) 1-8.

14. Wang, Y., Magda, J., Venkatesan, R., Sambath, K. and Deo, M. D., 2020, Experimental and theoretical investigation of waxy crude oil in steady pipe flows, Ind. Eng. Chem. Res. 2020, 59, 30.

15. Y Xia, A Blumers, Z Li, L Luo, YH Tang, J Kane, J Goral, H Huang, M Deo, M Andrew, A GPU-accelerated package for simulation of flow in nanoporous source rocks with many-body dissipative particle dynamics, 2020, Computer Physics Communications 247, 106874.

16. J. Goral, P. Panja, M. Deo, M. Andrew, S. Linden, J.O. Schwarz, A. Wiegman, 2020, Confinement Effect on Porosity and Permeability of Shales, *Scientific Reports*, 10(1), 1-11.

17. J. Goral, M. Deo, J. McLennan, H. Huang and E. Matson, 2020, Macro and micro compression testing of shales, J. Pet. Sci. and Eng., Vol 291 /doi.org/10.1016/j.petrol.2020.107034.

18. P. Panja, P. Asai, R. Velasco and M. Deo, 2020, Pre-processing protocol for nonlinear regression of uneven spaced data, Journal of Modeling and Optimization, 12(1)m 23-37.

19. P.Panja, R. Velasco and Deo, M.D., 2020, Understanding and modeling of gas condensate flow in porous media, Advances in Geo-Energy Res., 4., 2, 173-186.

20. P. Panja, TX Pack, M. Deo, 2020, Operational Optimization of absorption column in capturing CO2 from flue gas in coal-fired power plant, Chemical Engineering Communication, Vol. 208, 9, 1344-1357.

21. Wang, Yichen, Magda, J., Rama, V. and Deo, M. D., 2019, Effect of Emulsified Water on Gelled Pipeline Restart of Model Waxy Crude Oil Cold Flows, *Energy & Fuels*, 33 (11), 10756-10764.

22. Jan Goral, Ian Walton, Matthew Andrew, Milind Deo, 2019, Pore system characterization of organic-rich shales using nanoscale-resolution 3D imaging, Fuel, Volume 258, 10.1016/j.fuel.2019.116049.

23. Yidong Xia, Ansel Blumers, Zhen Li, Lixiang Luo, Yu-Hang Tang, Joshua Kane, Hai Huang, Matthew Andrew, Milind Deo, Jan Goral, 2019, A GPU-accelerated package for simulation of flow in nanoporous source rocks with many-body dissipative particle dynamics, Computer Physics Communications, accepted, 2019.

24. J Goral, M Andrew, T Olson, M Deo, Correlative core-to pore-scale imaging of shales, *Marine and Petroleum Geology,* 2019. https://doi.org/10.1016/j.marpetgeo.2019.08.009

25. P Asai, P Panja, J McLennan, M Deo, 2019, Effect of different flow schemes on heat recovery from Enhanced Geothermal Systems (EGS), *Energy*, 2019, Vol. 175, pp 667-676.

26. Corredor, EC, Deo, M.D., 2019, Techno-economic evaluation of a process for direct conversion of methane to aromatics, Fuel Processing Technology, **183,** 55-61.

27. Hoepfner, M. P. and Milind Deo, 2019, 19th International Conference on Petroleum Phase Behavior and Fouling, *Energy & Fuels* **2019** *33* (5), 3631-363.

28. Panja, P., Pathak, M. and Deo, M.D., 2019, Production of volatile oil and gas-condensate from liquid rich shales, Advances in Geo-Energy Research 3 (1), 29-42.

29. M Pathak, H Huang, P Meakin, M Deo, 2018, Molecular investigation of the interactions of carbon dioxide and methane with kerogen: Application in enhanced shale gas recovery, *Journal of Natural Gas Science and Engineering*, 51 1-8.

30. Velasco, R., Panja, P. and Deo, M.D., 2018, Simplification workflow for hydraulically fractured reservoirs, Petroleum, 4(2) 134-147.

31. Corredor, EC, Deo, M.D., 2018, Effect of vapor liquid equilibrium on product quality and yield in oil shale pyrolysis, Fuel, 1498-1506.

32. Cho, H., Caputo, D., Bartl, M. and Deo, M. D., 2017, Measurements of hydrocarbon bubble points in synthesized mesoporous siliceous monoliths, December 2017, *Chemical Engineering Science*, DOI10.1016/j.ces.2017.12.005.

33. Pathak, M., Kweon, H., Huang, H. and Deo, M.D., 2017, Kerogen Swelling and Confinement: Its implication on Fluid Thermodynamic Properties in Shales, December 2017, *Scientific Reports* 7(1), DOI10.1038/s41598-017-12982-4

34. Velasco, R., Panja, P., Pathak, M. and Deo, M. D., 2017, Analysis of North-American Tight Oil Production, November 2017, *AIChE Journal* DOI10.1002/aic.16034

35. Panja, P., Velasco, R., Pathak, M. and Deo, M. D., 2017, Application of artificial intelligence to forecast hydrocarbon production from shales, November 2017, *Petroleum*, DOI10.1016/j.petlm.2017.11.003

36. Ting, X, Kweon, H., McPherson, B. J. and Deo, M. D., 2017, Wormhole Generations in Indiana Limestone with CO 2 Intrusion: Numerical Simulations Based on Core Flooding Experiments, October 2017, *Energy & Fuels* 31(11), DOI10.1021/acs.energyfuels.7b01720

37. Ashley, W., Panja, P. and Deo, M. D., 2017, Surrogate models for production performance from heterogeneous shales, September 2017, *Journal of Petroleum Science and Engineering* 159, DOI10.1016/j.petrol.2017.09.044

38. Yidong Xia, Jan Goral, Hai Huang, Paul Meakin and Milind Deo, 2017, Many-body Dissipative Particle Dynamics Modeling of Fluid Flow in Fine-grained Nanoporous Shales, *Physics of Fluid*s, Volume 29, Number 5.

39. Panja, P., Velasco, R., Pathak, M. and Deo, M. D., 2017, Study Applies LSSVM to Tight Reservoirs, March 2017, The American Oil & Gas Reporter 60(3):50

40. Jing Zhou, Hai Huang, John McLennan and Milind Deo, A Dual-Lattice Discrete Element Model to Understand Hydraulic Fracturing in a Naturally Fractured System, 2017, *Hydraulic Fracturing Journal*, Volume 4, Number 2, pp 66-82.

41. Cho, H., Bartl, M. and Deo, M.D., 2017, Bubble Point Measurements of Hydrocarbon Mixtures in Mesoporous Media, DOI: 10.1021/acs.energyfuels.6b02424, *Energy & Fuels*, 31 (4), pp 3436-3444.

42. Pathak, M., Cho, H., and Deo, M.D., 2017, Experimental and Molecular Modeling Study of Bubble Points of Hydrocarbon Mixtures in Nanoporous Media, DOI: 10.1021/acs.energyfuels.6b02422, *Energy & Fuels*, 31(4), pp 3427-3435.

43. Pathak, M., Panja, P., Levey, R. and Deo, M.D., 2017, Effect of Organic Matter on Bubble Points of Oils in Shales, AIChE Journal, 63(7), 3083-3095.

44. H Kweon, M Deo, 2017, The impact of reactive surface area on brine-rock-carbon dioxide reactions in CO 2 sequestration, Fuel, http://dx.doi.org/10.1016/j.fuel.2016.10.010

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49. Palash Panja, and Milind Deo, 2016, Unusual Behavior of Produced Gas Oil Ratio in Low Permeability Fractured Reservoirs, Journal of Petroleum Science and Engineering, 144, 76-83

50. Pankaj Tiwari, Josh Staten and Milind Deo, Core Scale Oil Shale Pyrolysis, 2016, Chapter 7 in Utah Oil Shale: Science, Technology, and Policy Perspectives Jennifer Spinti, Editor, CRC Press, Taylor & Francis Group, July 2016

51. Harsh Maheshwari, John D. Roehling, Bryce A. Turner, Jamal Abdinor, Tien B. Tran-Roehling, Milind D. Deo, Michael H. Bartl, Subhash Risbud and Klaus Van Benthem, 2016, Robust mesoporous silica compacts: multiscale characterization of microstructural changes related to physical–mechanical properties, J Mater Sci (2016) 51:4470-4480, DOI 10.1007/s10853-016-9759-0.

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62. Jules J. Magda, Ahmed Elmadhoun, Peter Wall, Mark Jemmett, Milind D. Deo, Katherine L. Greenhillb and Rama Venkatesan, 2013, The Time-Dependent Axial Pressure Profile of a Model Waxy Crude Oil in a Steel Pipeline During Gelation and Flow Restart, dx.doi.org/10.1021/ef301513d Energy Fuels 2013, 27, 1909−1913.

63. Jemmett, M., Magda, J.J. and Deo, 2013, M.D., Heterogeneous Organic Gels, Rheology and Restart, dx.doi.org/10.1021/ef3014629 Energy Fuels 2013, 27, 1762−1771.

64. Krumm, R., Deo, M. D., and Petrick, M., 2012, Direct Thermal and Catalytic Treatment of Paraffinic Crude Oils and Heavy Fractions, Energy and Fuels, dx.doi.org/10.1021/ef2013985 Energy Fuels 2012, 26, 2663–2671.

65. Jemmett, M., Deo, M. D., Earl J. and Mognehan, P., 2012, Applicability of Cloud Point Depression to Cold Flow, 2012, *Energy Fuels*, **2012**, *26* (5), pp 2641–2647. Published, 05/2012.

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### Teaching Highlights

- Created a number of new courses in chemical engineering – most notably, Green Engineering, Environmental Applications in Chemical Engineering, Environmental Aspects of Fossil Fuels, Numerical Methods at the undergraduate and graduate levels.
- Helped create a new curriculum for an online degree in Petroleum Engineering Masters. The degree featured a few unique offerings – Energy and Society, Midstream-Downstream Engineering and a 10-day Field Studies class. Taught Reservoir Engineering and Reservoir Simulation in the Program.
- Was in the top 15% of College of Engineering Instructors (based on evaluations), five times
- Worked with other constituencies – Utah Department of Environmental Quality, ATK-Thiokol and the Utah Geological Survey – to bring additional expertise to the classroom.

### Courses Taught (New courses in bold)

| *Undergraduate Core* | *Graduate Core and Electives* |
|---|---|
| Fundamentals of Process Engineering | Fundamentals of Combustion |
| Engineering Thermodynamics | Chemical Reaction Engineering |
| Chemical Reaction Engineering | **Advanced Numerical Methods** |
| **Numerical Methods** | **Reservoir Engineering** |
| Projects Laboratory | **Enhanced Oil Recovery** |
| Undergraduate Seminar | **Multiphase Flow** |
| Process Design II | **Environmental Aspects of Fossil Fuels** |
| Process Safety | **Environmental Applications in Chemical Eng** |
| **Energy and Society** | **Green Engineering** |

### Graduate Student Mentoring

Current Group: three Ph.D. students (Taylor Jordan, Ahmed Elnashar (with Michael Bart), Yeonpyeong Jo and Luiz Passoa).

### Graduated Ph.D. Students (35 including co-advisees)

| | Student | Year | Employment | Dissertation Topic |
|---|---|---|---|---|
| 35 | Pranay Asai | 2021 | Lam Research, Freemont | Flow in nanopores and geothermal |
| 34 | Yichen Wang | 2019 | Post-Doc U of U | Wax and Emulsions |
| 33 | Jan Goral | 2019 | Intel, Portland | Nanoscale Imaging |
| 32 | Camilo Corredor | 2018 | Intel, Portland | Topics in Reactive Separation |
| 31 | Hyeyoung Cho | 2017 | University of Utah | Mesoporous Media Thermodynamics |
| 30 | Manas Pathak | 2016 | Intel Corporation | Oil Properties in Shales |
| 29 | Raul Velasco | 2015 | Intel (Tentative) | Advanced Reservoir Engineering |
| 28 | Jing Zhou | 2015 | Fracture Mech., CA | Hydraulic Fracture Propagation |

| | | | | |
|---|---|---|---|---|
| 27 | Hyukmin Kweon | 2015 | Innosense, CA | Study of CO2-Brine-Rock Reactions |
| 26 | Palash Panja | 2014 | Research Asst Prof, UofU | Shale Liquids Production |
| 25 | Justin Wriedt | 2014 | Calpen, California | Carbon dioxide sequestration |
| 24 | Robert Krumm | 2014 | GE Energy Services | Carbon Dioxide in pyrolyzed coal and shale |
| 23 | Nan Zhao | 2012 | ConocoPhillips | Geomechanics in reservoirs |
| 22 | Pankaj Tiwari | 2012 | IIT Guwahati, India | Oil Shale Kinetics |
| 21 | Mark Jemmett (with Magda) | 2012 | Phillips 66 | Flow Assurance – Wax Deposition |
| 20 | Jacob Bauman | 2012 | Orbital-ATK | Oil Shale Pyrolysis |
| 19 | Prashant Mandalaparty | 2011 | Petrotel, Dallas | CO2 Sequestration |
| 18 | Sangeetha Pasala | 2011 | SimSci, Esscor, CA | Subsurface Carbon Dioxide Injection |
| 17 | Zhiqiang Gu | 2010 | Halliburton- | Geochem Compositional Simulator |
| 16 | Chung-Kan Huang | 2009 | ConocoPhillips | Thermal Reservoir Simulation |
| 15 | Huabing Wang | 2008 | I-Reservoir | Multi-scale Fractured Reservoirs |
| 14 | Sriram Balasubramaniam | 2007 | Univ. of Houston | Compositional Modeling |
| 13 | Yao Fu | 2007 | Shell Oil | Reservoir Simulation |
| 12 | Ganesh Balasubramanian | 2006 | Chevron | Optimization in Reservoirs |
| 11 | Sriram Satya (with Hanson) | 2005 | Phillips 66 | Chemometrics |
| 10 | Sandeep Todi | 2005 | India | Pipeline Wax Particle Transport |
| 9 | Kyoengseok Oh | 2004 | Inha Col., Korea | Asphaltene Aggregation |
| 8 | Yi-kun Yang | 2003 | Van Gotten, TX | Finite-Element Reservoir Simulator |
| 7 | Martha Parra Ramirez | 2001 | Ecopetrol | CO2 Asphaltene Precipitation |
| 6 | Jonggyun Kim | 1999 | ANL, DC Lab | DFN and Parallel |
| 5 | Rajesh Pawar | 1998 | LANL | Fractured Reservoirs |
| 4 | Subramanian (With Hanson) | 1996 | M. W. Kellog, | Supercritical Extraction |
| 3 | E. Whitney (With Bodily) | 1995 | LANL | Modeling Coalbed Methane Flow |
| 2 | Peter Rose | 1994 | EGI | Steam Assisted Gravity Drainage |
| 1 | J. Hwang (With Hanson) | 1992 | Hanwha Energy | Supercritical Fluid Extraction |

**Masters Students**
Supervised 13 Chemical Engineering Masters theses, 3 Petroleum Engineering Masters theses and about 15 Petroleum Engineering Masters Projects.

## *Service*

### *Service Highlights*

### *Academic Leadership and Accomplishments*

- Department Chair, Chemical Engineering (2013-2018)
    - Added nine new faculty members (to existing 13).
    - Created the Meldrum Innovation Laboratory – a hands-on exploration and discovery space with 3-D printers and laser cutters.
    - Established a high-quality, 71-seat graduate student and post-doc office space to create a research community.
    - Implemented an online MS in Petroleum Engineering.
    - Grew the total number of graduates in the Department from about 50 in 2011-12 to about 120 in 2017-18.
- Associate Dean for Academics in the College of Engineering (2006-2013)
    - Oversaw outreach, curriculum, advising, accreditation teaching development and other academic matters.
    - Coordinated a successful ABET accreditation of the seven programs in college of engineering and three programs in the college of mines in 2009.
    - Worked with the Math Department to create a four-semester Engineering Math sequence.

**Service and Synergistics Activities**

- Professional Societies: Member of American Chemical Society (ACS), American Institute of Chemical Engineers (AIChE), Society of Petroleum Engineers (SPE).
- Professional Service: *Overall Meeting Programming Chair*, 2015 AIChE Annual Meeting, Salt Lake City; Book Committee of the SPE; Advisory Board Member, Upstream Flow Assurance and Heavy Oil Forum of the AIChE.
- Petrophase in Deer Valley, Utah – Meeting co-chair with Michael Hoepfner. Attended by about 200 professionals about petroleum phase behavior related topics.
- Performed Graduate Review (Internal Committee) of Mining and Metallurgical Engineering Departments.
- Reviewer on UROP Proposals.
- Member of the University Task Force on Centers and Institutes
- Member of the LEAP Advisory Board (2010-2013)

**Service Assignments**

Leadership

Chair of Chemical Engineering from 2013-2019

Associate Dean of Academic Affairs from 2006-2013, overseeing outreach, curriculum, advising, accreditation and other academic matters. Coordinated a successful accreditation of the seven programs in College of Engineering and three programs in the College of Mines in 2009.

***University Assignments***

Member of the Center and Institutes University Committee reporting to the Executive Committee of the Senate

LEAP Advisory Board: 2010-2013

Chairman Graduation Committee: 1999

Evaluated petitions for exceptions to graduation requirements, called and convened meetings, and initiated policy changes, if required.

Graduation Committee – Member: 1996-1998

Evaluated petitions for exceptions to graduation requirements. Met once or twice a quarter.

***College Committee Assignments***

Chair, College Council: 2005-2006

Chair, College Academic Appeals Committee: 2002-2004

Supervised the resolution of eight appeals.

College Computer Committee: 1996-2000

Provided input (from the departmental perspective) for better utilization of the college computing system. Formulated departmental computing requests. Met 1 - 4 times a quarter.

Member, College Council: 1994-1997

Was a departmental representative on the college governing body.

***Departmental Committees***

Coordinator, ABET Protocols and Procedures

Responsible for coordinating accreditation efforts. The structure requires formulation of objectives and outcomes, creation of a curriculum to meet the objectives, developing a mechanism to assess outcomes and to evaluate objectives, and to have in place a mechanism for changing the curriculum based on the resulting feedback.

Chairman, Undergraduate Committee: 2000-2001

Responsible for the undergraduate curriculum; ABET; petitions

AIChE Student Chapter Advisor (Academic): 1999-2000

Member, Undergraduate Committee: 1992-2000

Met once in two weeks on the average to consider all aspects of the undergraduate program.

Senior Advisor: 1996-2000

Interviewed all graduating seniors, checked graduation requirements, suggested changes and evaluated petitions. On the average, this involved spending 20-30 minutes with each graduating senior (30-35) in the Fall.

Computer Committee: 1996-2000

Helped determine departmental computer needs. Responded to solicitations and made spending decisions.

Semester Conversion Committee: 1996-98

Worked on formulating and placing course descriptions on the web and on establishing equivalence. Professor Lamont Tyler was the chairman of the committee. Received Dean's Service Award for this work during the semester conversion.

***Professional Societies***

AIChE Fellow, elected 2012

Annual Meeting Topical Chair

Organized six sessions as part of a topical on Complex Subsurface Processes at the AIChE Meeting in Salt Lake City in November 2011.

Member, Society of Petroleum Engineers

Currently one of the Directors of the Salt Lake Petroleum Section. Served at various times as Program Manager, Director, Chairman, Scholarships Chairman of the local chapter. SPE Student Chapter Advisor.

Member, Sigma Xi Scientific Research Society

Served as a Chairman of the local chapter of the Society in 1995. Organized the annual banquet and coordinated scholarship efforts.

Member, American Chemical Society

Member of the organizing committee – 69$^{th}$ Colloid and Surface Science Symposium of the ACS.