# Name and Title

John D. McLennan

Professor, Department of Chemical Engineering, University of Utah

# Summary

# John McLennan is a Professor in the Department of Chemical Engineering at the University of Utah, joining the faculty in 2009. He has also been a Senior Research Scientist at the Energy & Geoscience Institute at the University of Utah, since January 2008. He has a Ph.D. in Civil Engineering from the University of Toronto, in 1980. He had more than twenty-eight years of experience in geomechanics with petroleum service and technology companies, prior to joining the university. He worked nine years for Dowell Schlumberger in their Denver, Tulsa, and Houston facilities. Later, with TerraTek in Salt Lake City, Advantek International, in Houston, and ASRC Energy Services, in Anchorage, he worked on projects concerned with coalbed methane recovery, rock mechanical properties determinations, produced water and drill cuttings reinjection, as well as casing design issues related to compaction. Recent work has focused on optimized hydrocarbon production from shales and unconsolidated formations, fluid-rock interactions, geothermal energy recovery, in-situ microbial generation of natural gas, and high-temperature rock testing. He currently is the co-Principal Investigator for the Department of Energy’s $200,000,000+ FORGE (Frontier Observatory for Research in Geothermal Energy). Recently, he has also been heavily involved with lower-temperature geothermal applications and subsurface thermal storage.

# Education

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| B.A.Sc. | Geological Engineering, University of Toronto, 1974 |
| M.A.Sc. | Civil Engineering (Soil Mechanics), University of Toronto, 1976 |
| Ph.D. | Civil Engineering (Rock Mechanics), University of Toronto, 1980Dissertation: Hydraulic Fracturing: A Fracture Mechanics Approach |

# Organizations and Societies

**Society of Petroleum Engineers (SPE)**

Member

2007 Chairperson of Salt Lake Petroleum Section

2008-present Program Chair

2012-2014 Membership Committee

**American Rock Mechanics Association (ARMA)**

Member

2012 Elected to Board of Directors

2013 Elected Vice President

2013 Inducted as an ARMA Fellow

2014 President-Elect

2015-2017 President

**American Institute of Chemical Engineers (AIChE)**

Member

**Society of Core Analysts (SCA)**

1995-1996 Co-Treasurer, U.S. Director

# Honors and Awards

 **(EGI)**

EGI

**Career and Professional Development**

Faculty Recognition Award – April 2018

Faculty Recognition Award – April 2019

**J. Willard Marriott Library, Celebrate U, Extraordinary Faculty Achievements**

Top Researcher Award for FORGE: Frontier Observatory for Research in Geothermal Energy - April 2019

**Society of Petroleum Engineers (SPE)**

Regional Service Award, Rocky Mountain North America Region, Awarded 2012

**American Rock Mechanics Association (ARMA)**

Inducted as an ARMA Fellow, Inducted in June 2013

Distinguished Service Award, June 2021

# Academic and Industrial Experience

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| --- | --- | --- |
| May 2020 |  | Professor, Department of Chemical Engineering, University of Utah |
| October 2009 – May 2020 |  | Associate Professor, Department of Chemical Engineering, University of Utah |
| October 2009 - Present |  | Adjunct Professor, Department of Civil Engineering, University of Utah |
| January 2008 - October 2009 |  | Senior Research Scientist, Energy & Geoscience Institute, Departments of Civil and Chemical Engineering and Department of Chemical Engineering, University of Utah |
| July 2015 – Present |  | Adjunct Professor, China University of Petroleum, Beijing |
| July 2015 - Present |  | Adjunct Professor, China University of Petroleum, East China  |
| 2003 - 2008 |  | Technical Director, ASRC Energy Services E & P Technology, Anchorage, AK |
| 2001 - 2002 |  | Executive Vice President, Advantek International Corporation, Salt Lake City, UTInvolved with projects ranging from individual consulting efforts to participation in large consortium projects concerning produced water reinjection, compaction/ subsidence, and wellbore integrity. Central participant in corporate strategy to consolidate numerical and analytical tools, historical experience, correlations, and risk analysis in overall knowledge-based packages for planning, drilling, completing, stimulating, and managing reservoirs. Other projects encompass software development; evaluations, predictions, back-analyses, recommendations for exploitation strategies; and formulation of Best Practices. |
| 1989 - 2001 |  | Executive Vice President, TerraTek, Inc., Salt Lake City, UT**Vice President** — 1992-1999Management of field and laboratory routine and special core analysis, geology, computerized tomography, and rock mechanics investigations for oil/gas, coal, and civil construction projects. Supervision of approximately 25 scientists, engineers, technicians, and support staff. Coordination of sales, marketing, and relevant accounting/project tracking activities. Technical participation in high-profile and new venture projects including multiple projects for the Gas Research Institute. Rock Mechanics Short Courses for clients.**Vice President, Engineering Testing and Simulations** — 1989-1992Management of field and laboratory rock mechanics investigations for oil/gas, coal, and civil construction projects. |
| 1987 - 1989 |  | Program Leader, Rock and Fracture Mechanics, Dowell Schlumberger Inc., Tulsa, OKManage rock and fracture mechanics development effort (4 scientists and 1 technician). Development of technology for production prediction from horizontal wellbores. Development of technology for fracturing and matrix acidizing deviated wellbores (theoretical, numerical, and field validation). Supervise upgrade of laboratory testing and analysis capabilities for rock mechanics testing. Large-scale laboratory polyaxial testing for the assessment of deviated wellbore fracturing, acid fracturing, and in-situ stress measurement. Interaction with development chemists for the design of field-testing for product evaluation. Evaluation of the influence of perforations on hydraulic fracture initiation. Technical review of research efforts on wellbore stability, poroelasticity, and fundamental fracture mechanics. Fracture design, back-analysis, and troubleshooting for high-profile field operations. Lecturer in Schlumberger Educational Services Advanced Reservoir Stimulation client schools. |
| 1986 - 1987 |  | Technical Center Manager, Dowell Schlumberger Inc., Denver, COManage $1,000,000 customer service laboratory. Provide field support, including laboratory testing, treatment fluid design, and formation evaluation for all of Dowell Schlumberger's North American operations. Fracture and acidizing design, back-analysis, troubleshooting, and customer interface for high-profile field operations. |
| 1981 - 1985 |  | **Senior Research Engineer, Rock Mechanics,** Dowell Schlumberger Inc., Tulsa OKFundamental fracturing research on fluid loss during hydraulic fracturing. Fundamental research on static and dynamic mechanical properties for stress prediction. Develop pseudo-three-dimensional hydraulic fracturing code. Formation evaluation, treatment design, and optimization.  |
| 1980 - 1981 |  | **Senior Engineer,** TTI Geotechnical Resources Ltd., Calgary, Alberta CanadaOpen a two-man Canadian office for a U.S. Corporation. Field supervision and data analysis for four hydraulic fracturing stress measurement programs in Canada, and assistance with hydraulic fracturing stress measurements at two localities in the United States. |

# Research Grants and Foundation Support

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| **Current or Recent** |
| Mountainwest Pipeline, LLC | Mechanical Properties Testing |
| $10,000 |  | Awarded 11/2023 |
| DOE/EERE (subcontract to Calpine) | Evaluation of Physics-Based Drilling and Alternative Bit Design at The Geysers |
| $345,000 |  | 10/2023-9/2024 |
| U.S. Department of Energy | FORGE Phase 3 |
| $220,000,000 | With J. Moore | 07/2019 – 06/2024 |
| University of Utah | Seed Funding – Algal Bloom Forecasting |
| $35,000 |  | 03/2021 – 03/2022 |
| National Science Foundation  | EAGER - Geothermal Battery Energy Storage Technical Feasibility |
| $299,033 |  | 02/2019-12/2019 |
| Department of Energy | Cane Creek Emerging Play |
| $341,877 | With B.J. McPherson | 2019-2022 |
| National Science Foundation  | Reducing Environmental Impact of Hydraulic Fracturing by Improved Effectiveness of Pumped Fluid and Proppant |
| $49,105 |  | 2019 |
| U.S. Department of Energy | FORGE Phase 2C |
| $10,000,000 | With J. Moore | 06/2018 – 07/2019 |
| PacifiCorp | Application/Feasibility Study for Regional/Commercial Use of CO2 for Enhanced Coal-Bed Methane Recovery Study |
| $274,799 |  | 11/2017 – 12/2021 |
| Department of Energy | Multi-Scale Fluid-Solid Interactions in Architected and Natural Materials “MUSE” |
| $360,000 | Co-Investigator | 08/2018 – 07/2022 |
| Office of Energy Development | OED FORGE |
| $6,000 |  | 01/2019 – 06/2019 |

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| **Pending** |
| NSF | EAGER, Geothermal Hybridization |
| $299,978 |  | Submitted 08/15/2023 |

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| Past |
| Pearl Exploration | West Rozel Evaluation |
| $13,815 |  | 02/2008-04/2008 |
| Pioneer Natural Resources | Model Runs for Cuttings Reinjection |
| $3,000 |  | 05/2008-05/2008 |
| BP America Exploration | Cuttings Injection Short Course |
| $16,884 |  | 01/2009-03/2009 |
| MI Swaco | Synthesis of Soft Formation literature |
| $30,000 |  | 01/2008-12/2009 |
| BP America Exploration | Northstar Fracture Modeling |
| $2,000 |  | 01/2010-02/2010 |
| Alberta Research Council | Enhanced Permeability |
| $72,000 |  | 01/2008-03/2010 |
| Itasca Houston | Montney Study Project |
| $25,000 |  | 02/2010-09/2010 |
| Schlumberger DCS | Rock-Fluid Interaction |
| $266,667 |  | 05/2008-12/2010 |
| Shale Gas Systems – 2 | EGI Consortium |
| $750,000 | With M.P. Segall | 01/2009-12/2010 |
| BP America Exploration | Beanup Development Effort |
| $195,000 |  | 01/2008-06/2011 |
| BP America Exploration | Fracturing in Soft Formations |
| $642,500 |  | 05/2009-12/2012 |
| HDR Inc. | Uintah Transportation Study |
| $12,219 |  | 10/2012-12/2012 |
| Higgs Palmer  | Developing Algorithms: Enhanced Permeability |
| $10,000 |  | 04/2011-03/2013 |
| Department of Energy | CASE UFUELS Task 4.2 – Oil Shale Processing |
| $377,894 | With M.D. Deo | 07/2009-09/2013 |
| Department of Energy | CASE UFUELS SAR Task 7.1 Capstone |
| $223,057 | With P. Smith | 07/2009-09/2013 |
| Department of Energy | Case UFUELS Task 4.7 –Geomechanics |
| $168,074 | With P. Smith | 01/2011-09/2013 |
| Department of Energy | Case UFUELS Task 4.7 –matching funds |
| $13,907 | With P. Smith | 01/2011-09/2013 |
| BP America Exploration | Sand Production Assessment |
| $50,000 |  | 09/2012-09/2013 |
| Far East Energy  | Geologic Controls on Production |
| $118,000 | With EGI Staff | 03/2013-09/2013 |
| Department of Energy | Proppant Behavior - Geothermal Conditions |
| $972,751 | With J. Moore | 09/2008-12/2013 |
| Department of Energy | Proppant Behavior – matching funds |
| $5,298 | With J. Moore | 09/2008-12/2013 |
| BP America Exploration | Sand Production Assessment |
| $50,000 |  | 04/2013-12/2013 |
| Department of Energy | Raft River Geothermal EGS |
| $8,591,766 | With J. Moore | 04/2009-06/2014 |
| Department of Energy | Raft River Geothermal EGS – matching funds |
| $33,415 | With J. Moore | 04/2009-06/2014 |
| Utah Geological Survey | Liquid Rich Shale Potential |
| $195,000 |  | 12/2012-09/2015 |
| Utah Geological Survey | Liquid Rich Shale Potential – matching funds |
| $32,696 |  | 12/2012-09/2015 |
| Department of Energy | Microbial Coal Conversion |
| $102,533 | PI Taylor Sparks | 10/2014-09/2017 |
| Midstates Petroleum | Effective Acidizing in the Mississippi Limestone |
| $45,000 | With EGI Staff | 09/2015-06/2016 |
| EGI Consortium | Large Scale Geologic Controls |
| $150,000 |  | Ended 2019 |
| Reaction Engineering Intl | HPC-Based Validation |
| $40,532 |  | 02/2017-11/2017 |
| Department of Energy | FORGE 2A and 2B |  |
| $185,756 |  | Ended April 2018 |
| Carraigmore Petroleum  | Reserves Evaluation |  |
| $22,999 |  | 12/2017-08/2018 |
| Utah OED | OED FORGE - 1 |
| $16,000 |  | Ended 2018 |
| Reaction Engineering Intl | HPC Flowback and Cleanup Tool |
| $156,917 |  | 04/2016-09/2018 |

# Research Associates and Post Doctorates Supervised

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# Post-Doctoral and Research Associates

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| Previous |
| Lianbo Hu | Post Doctoral Researcher – Ph.D. Petroleum Engineering, University of Oklahoma |
| Pengju Xing | Post Doctoral Researcher – Ph.D. Civil Engineering, University of Pittsburgh |
| Thang Tran | Previous degree – Ph.D. Chemical Engineering, University of Utah |
| Ravi Bhide | Previous degree – Ph.D. Metallurgical Eng., University of Utah |
| Dadmehr Rezaei | Previous degree – Ph.D. Chemical Engineering, University of Utah |
| Thu Nguyen | Currently with Sasol, Lake Charles, LA |
| Dung Tran | Currently with PetroVietnam |

# Graduate Students

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| **Present (Supervisor)** |
|  |  |  |
| Aleksandr Goncharov | Ph.D. | Chemical Engineering (2024) |
| William Nguyen | Ph.D. | Chemical Engineering (2022) |
| Peter Li | Ph.D. | Chemical Engineering (2024) |
|  |
| **Previous (Supervisor) MS** |
| Josh Thompson | MS | ChemicalEngineering |
|  | Thesis: Chemo-Mechanical Effects on Rock Strength, Young's Modulus and Poisson's Ratio (2010) |
| Daniel Brinton | MS | Chemical Engineering |
|  | Thesis: Issues Surrounding Fracturing of Geothermal Systems – Predicting Thermal Conductivity of Reservoir Rocks and Evaluating Performance of Fracture Proppants (August 2011) |
| John Gregory | MS | Chemical Engineering |
|  | Project An Examination of the Decrease of Natural Gas Storage Deliverability Due to Possible Two-Phase Flow in a Wellbore (April 2011) |
| Trevor Stoddard | MS | Chemical Engineering |
|  | Thesis: Fracture Conductivity of a Bauxite-Propped Geothermal System (June 2011) |
| John Carnell | MS | Chemical Engineering |
|  | Thesis: Working Fluid Selection For An Increased Efficiency Hybridized Geothermal-Solar Thermal Power Plant In Newcastle, Utah (May 2012) |
| Ameya Chaudhari | MS/MBA | Chemical Engineering/ Business |
|  | Project: Sustaining Fracture Area and Conductivity of Gas Shale Reservoirs for Enhancing Long-Term Production and Recovery (2012) |
| Trace Larsen | MS  | Chemical Engineering |
|  | Project: Proprietary to Rio Tinto (2013) |
| Jacob Abraham | MS  | Petroleum Engineering |
|  | Thesis: Optimization of Hydraulic Fracturing of Tight Gas Formations in Horizontal Wells (2013) |
| Alan Walker | MS  | Petroleum Engineering |
|  | Thesis: Evolution of the Utah Energy Research Triangle: A Contemporary Case Study in the Nexus of Applied Research and Public Policy (2015) |
| Walter Glauser | M.S. | Chemical Engineering |
|  | Thesis: Simulating Evolution of Poroelasticity and Deformation in Green River Oil Shale Under In Situ Pyrolysis (2016) |
| Bryan Forbes | M.S. | Petroleum Engineering |
|  | Thesis: Optimization of Horizontal Well Completions Using an Unconventional Complex Fracture Model (2016) |
| Stephanie Prochaska | M.S. | Petroleum Engineering |
|  | Project (2016) |
| Abiola Abereoje | M.S. | Petroleum Engineering |
|  | Project (2016) |
| Peijian Li | M.S. | Petroleum Engineering |
|  | Project (2017) |
| James Schloss | M.S. | Petroleum Engineering |
|  | Project (2017) |
| Yi Zhang | M.S. | Petroleum Engineering |
|  | Project (2017) |
| Najaf Dostaliyev | M.S. | Petroleum Engineering |
|  | Project (2017) |
| David Brown | M.S. | Petroleum Engineering |
|  | Project (2017) |
| Brandon Palmer | M.S. | Petroleum Engineering |
|  | Project (2017) |
| Nicolas Morton | M.S. | Petroleum Engineering |
|  | Project (2018) |
| Ryan Lacy | M.S. | Petroleum Engineering |
|  | Project (2018) |
| Angel Perdomo | M.S. | Petroleum Engineering |
|  | Project (2018) |
| Haimanot Tirfe | M.S. | Petroleum Engineering |
|  | Project (2018) |
| Gavin Ferguson | M.S. | Petroleum Engineering |
|  | Project (2018) |
| Pranay Asai | M.S. | Petroleum Engineering |
|  | Thesis: Study Of Heat And Fluid Flow In Doublet Enhanced Geothermal Systems (2018) |
| Rohan Vijapurapu | M.S. | Petroleum Engineering |
|  | Project: Comparative Study of Injection Gas Performance in Huff-N-Puff EOR Operation in Shale (2019) |
| Chang Yuan | MS | Petroleum Engineering (2019) |
| Bethany Hancock | MS | Petroleum Engineering (2019) |
| Jerjes Porlleshurtado  | MS | Petroleum Engineering (2019) |
| Yifan Chen | MS | Petroleum Engineering (2019) |
| Oluwafemi Omotilewa | MS | Petroleum Engineering (2020) |
| Andrew Diep | MS | Petroleum Engineering (2020) |
| Nasikul Islam | MS |  Petroleum Engineering (2020) |
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| **Previous (Supervisor) Ph.D.** |
| Jacob Bradford | Ph.D. | Chemical Engineering |
|  | Thesis: The Application of Hydraulic and Thermal Stimulation Techniques to Create Enhanced Geothermal Systems (2016) |
| Eric Brauser | Ph.D. | Chemical Engineering |
|  | Thesis: Experimental and Modeling Evaluation of Aqueous-Phase Transport Behavior of Quantum Dots in High Temperature Porous Media (2016) |
| John Fuertez | Ph.D. | Chemical Engineering |
|  | Thesis: Biogenic Methane Production from Coal Using Methanogenic Microbial Consortia (2017) |
| Raili Taylor | Ph.D. | Chemical Engineering |
|  | Thesis: Fatigue Damage of the Cement Sheath In Oil and Gas Wells (2018) |
| David Shaw | Ph.D. | Chemical Engineering |
|  | Thesis: Mass Transfer in the Pathogenesis and Treatment of Eosinophilic Esophagitis (2018) |
| Thang Tran | Ph.D. | Chemical Engineering |
|  | Thesis: Evaluation of Mechanical and Transport Properties of In Situ Processed Oil Shale in Green River Formation (2018) |
| Jeff Easton | Ph.D. | Chemical Engineering |
|  | Thesis: Environmental Sequestration of Boron (2019) |
| Siavash Nadimi | Ph.D. | Chemical Engineering |
|  | Thesis: Importance Of Hydro-Shearing In Impermeable Naturally Fractured Reservoirs (2019) |
| Carlos Vega-Ortiz | Ph.D. | Chemical Engineering  |
|  | Optimization Of CO2 Mass Transport and Storage at In-Situ Conditions in Unconventional Plays: Coalbed Methane and Carbonaceous Mudstones (2021) |
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| **Present (Committee Member)** |
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| Changdi He | Ph.D. | Mining Engineering |
| Yunzhi Chen | Ph.D. | Chemical Engineering |
| Luiz Emilio Pessoa Timeni de Moraes Filho  | Ph.D. | Chemical Engineering |
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| **Previous (Committee Member)** |
| Danial Zeinabadybejestani | Ph.D. | Petroleum Engineering, University of Calgary |
| An Ho | Ph.D. | Chemical Engineering |
| Blake Billings | Ph.D. | Chemical Engineering |
| Weiyi Kong | Ph.D. | Chemical Engineering |
| Lani McKinnon | Ph.D. | Chemical Engineering |
| Mason John | Ph.D. | Chemical Engineering |
| Shruti Hegde | Ph.D. | Chemical Engineering |
| Yichen Wang | Ph.D. | Chemical Engineering |
| Dhrupadraghuveer Beti | Ph.D. | Chemical Engineering |
| Ding Wang | Ph.D. | Chemical Engineering |
| Jan Goral | Ph.D. | Chemical Engineering |
| Patrick Bradshaw | MS | Geology & Geophysics |
| Venkataram Poosapati | ME | Mechanical Engineering |
| Angela Kennedy | MS | Geology |
| Aniket Surdi | MS | Mechanical Engineering |
| Bernardo Castro-Dominguez | MS | Chemical Engineering |
| Chad Wilding | MS | Chemical Engineering |
| Daniel Coates | MS | Chemical Engineering |
| Darin Oberg | MS | Mining Engineering |
| David Austin | MS | Mechanical Engineering |
| Dhrupadraghuveer Beti | MS | Chemical Engineering |
| Farhan Ahmad | MS | Chemical Engineering |
| Jared Stradley | MS | Chemical Engineering |
| Matthew Wavada | MS | Chemical Engineering |
| Swapnil Thakur | MS | Chemical Engineering |
| Amir Biglari | Ph.D. | Chemical Engineering |
| Aubry Dereuil | Ph.D. | Geology |
| Eduardo Cordova | Ph.D. | Mining Engineering |
| Hedieh Saffari | Ph.D. | Chemical Engineering |
| Jacob Bauman | Ph.D. | Chemical Engineering |
| Joao Luna Gonzalez  | Ph.D. | Geology |
| Jon Wilkey | Ph.D. | Chemical Engineering |
| Justin Wriedt | Ph.D. | Chemical Engineering |
| Keith Gnishin | Ph.D. | Chemical Engineering |
| Kerry Kelly | Ph.D. | Civil Engineering |
| Khalid Rashid | Ph.D. | Chemical Engineering |
| Mark Jemmett | Ph.D. | Chemical Engineering |
| Nan Zhao | Ph.D. | Chemical Engineering |
| Ola Opara | Ph.D. | Metallurgical Engineering |
| Palash Panja | Ph.D. | Chemical Engineering |
| Robert Krumm | Ph.D. | Chemical Engineering |
| Seth Craig | Ph.D. | Mechanical Engineering |
| Ziqiang Gu | Ph.D. | Chemical Engineering |

# Undergraduate Students Supervised and Theses

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| **Recent (Supervised)** |
| Matthew Parker (UROP Summer 2020) | Chemical Engineering |
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| **Previous (Supervised)** |
| Jacob Abraham | Kevan Donley | Samuel Doane |
| Walter Glauser | Tyler Gohring | James Huang |
| Maureen Larsen | Tyler Lee | Melissa Ramallo |
| Junda Wang | Jared Weber | Marcus d’Ambrosio (UROP) |
| Jacob Abraham | Honors | Chemical Engineering |
|  | Thesis: Numerical Modeling of Multiple Hydraulic Fractures in Shale Using MFrac |

# Contributions to Innovative Teaching

Participant in a team introducing a new MS degree in Petroleum Engineering (approval by the University of Utah Board of Regents in July 2013). The targeted audience is new engineering graduates looking for petroleum engineering background and mid-career professionals with the same interest. The 16-month, 33-credit degree immerses the student in petroleum engineering technology. Lecturing is in person and with a full distance learning component. Implemented online recruitment methods and use of social media, with assistance from COE staff. The degree was put on hold in 2021 in lieu of shifting educational parameters to an energy transition agenda.

# Teaching Responsibilities

|  |  |
| --- | --- |
| Spring Semester 2010 | Production Engineering I CH EN 5157Production Engineering II CH EN 5159Production Engineering I CH EN 6157Production Engineering II CH EN 6159 |
| Fall Semester 2010 | Fluid Mechanics CH EN 3353 |
| Spring Semester 2011 | Production Engineering I CH EN 5157Production Engineering II CH EN 5159Production Engineering I CH EN 6157Production Engineering II CH EN 6159 |
| Fall Semester 2011 | Fluid Mechanics CH EN 3353 |
| Spring Semester 2012 | Production Engineering I CH EN 5157Production Engineering II CH EN 5159Production Engineering I CH EN 6157Production Engineering II CH EN 6159 |
| Fall Semester 2012 | Fluid Mechanics CH EN 3353Graduate Seminar CH EN 7857 |
| Spring Semester 2013 | Production Engineering I CH EN 5157Production Engineering II CH EN 5159Production Engineering I CH EN 6157Production Engineering II CH EN 6159Graduate Seminar CH EN 7859 |
| Fall Semester 2013 | Fluid Mechanics CH EN 3353Graduate Seminar CH EN 7857Drilling Engineering CH EN 6181-001Drilling Engineering CH EN 6181-030 |
| Spring Semester 2014 | Graduate Seminar CH EN 7859Petroleum Production Engineering CH EN 6167-001Petroleum Production Engineering CH EN 6167-030 |
| Fall Semester 2014 | Fluid Mechanics CH EN 3353Graduate Seminar CH EN 7857Drilling Engineering CH EN 6181-001Drilling Engineering CH EN 6181-030 |
| Spring Semester 2015 | Graduate Seminar CH EN 7859Petroleum Production Engineering CH EN 6167-001Petroleum Production Engineering CH EN 6167-030 |
| Fall Semester 2015 | Fluid Mechanics CH EN 3353Graduate Seminar CH EN 7857 |
| Spring Semester 2016 | Graduate Seminar CH EN 7859Petroleum Production Engineering CH EN 6167-001Petroleum Production Engineering CH EN 6167-030 |
| Fall Semester 2016 | Graduate Seminar CH EN 7857Introduction to Chemical Engineering CH EN 1703 |
| Spring Semester 2017 | Graduate Seminar CH EN 7859Petroleum Production Engineering CH EN 6167-001Petroleum Production Engineering CH EN 6167-030 |
| Fall Semester 2017 | Graduate Seminar CH EN 7857Introduction to Chemical Engineering CH EN 1703 |
| Spring Semester 2018 | Graduate Seminar CH EN 7859Petroleum Production Engineering CH EN 6167-001Petroleum Production Engineering CH EN 6167-030 |
| Fall Semester 2018 | Graduate Seminar CH EN 7857Introduction to Chemical Engineering CH EN 1703 |
| Spring Semester 2019 | Graduate Seminar CH EN 7859Petroleum Production Engineering CH EN 6167-001Petroleum Production Engineering CH EN 6167-030 |
| Fall Semester 2019 | Graduate Seminar CH EN 7857Introduction to Chemical Engineering CH EN 1703 |
| Fall Semester 2019 | Graduate Seminar CH EN 7857Intro to Chemical Engineering CH EN 1703 |
| Spring Semester 2020 | Graduate Seminar CH EN 7859Fluid Mechanics CH EN 3353 |
| Fall Semester 2020 | Graduate Seminar CH EN 7857Fluid Mechanics CH EN 3353 |
| Spring Semester 2021 | Graduate Seminar CH EN 7859Capstone Project CH EN 4509 |
| Fall Semester 2021 | Graduate Seminar CH EN 7857Capstone Project CH EN 4706 |
| Spring Semester 2022 | Graduate Seminar CH EN 7859Capstone Project CH EN 4707Geothermal Engineering CH EN 5920 |
| Fall Semester 2022 | Graduate Seminar CH EN 7857Capstone Project CH EN 4706 |
| Spring Semester 2023 | Graduate Seminar CH EN 7859Capstone Project CH EN 4707 |
| Fall Semester 2023 | Graduate Seminar CH EN 7857Fluid Mechanics CH EN 3353 |

# Recent Short Courses

1. McLennan, J. 2023. Geothermal Energy: An Overview of Opportunities, SLB, 3 hours, online.
2. McLennan, J. 2022. Drilling, Reservoir Characterization, and Fracturing in Geothermal Settings, International Geomechanics Symposium, Abu Dabhi, November 7.
3. McLennan, J. 2022. Geomechanics Considerations for Geothermal Well Construction, Completion, and Operation, EGI Corporate Associates Meeting, Salt Lake City, UT, September 23, 2022.
4. McLennan, J. 2019. Wellbore Stability, Suncor, St. Johns, Nfld, (June).
5. McLennan, J. 2017. Geomechanics, Orlen Upstream, Calgary, AB.
6. McLennan, J. 2017. Geomechanics, Cimarex, Tulsa, AB.
7. McLennan, J. and Birgenheier, L. 2013. Geology and Geomechanics of Shale Reservoirs, Short Course, 2013 AAPG Rocky Mountain Section Meeting, Salt Lake City, UT, Sept. 21.
8. McLennan, J.D. 2013 Shale Petrophysics (Day 1), Shale Geomechanics (Day 2), Short course to Yanchang Petroleum, Xian City, China, June 18-19.
9. McLennan, J.D. and Rose, P. 2013. Geomechanics Considerations Including Tracer Technologies, presented to EGI Corporate Associates, April 12.
10. Bereskin, S.R. and McLennan, J.D. 2013. Understanding Production from Mud Rocks, Short Course for West Texas Geological Society, Midland, TX, March 1.
11. McLennan, J.D. 2012. Oil Shale Geomechanics, Short Course for Statoil, [with Smith, P., Deo, M., Fletcher, T.], Trondheim, Norway, October 9.
12. Bereskin, S.R. and McLennan, J.D. 2011. Understanding Production from Mud Rocks, Short Course for West Texas Geological Society, Midland, TX, March 17.
13. McLennan, J.D. 2011. Shale Gas Resources, Hydraulic Fracturing, Geomechanics, Short Course to Sinopec, November.
14. McLennan, J.D. and Walton, I. 2011. Shale Gas Exploration and Production Technologies, Short Course to Orlen Oil and Gas Company, Warsaw, Poland, Jan. 24-25.
15. McLennan, J.D. 2010. Shale Gas, Short Course to GDF, Paris, France.
16. McLennan, J.D. 2009. Cuttings Injection, Short Course to BP Azerbaijan, Baku, Azerbaijan, March.
17. McLennan, J.D. 2009. Geomechanical Considerations for Shales, Short Course to ConocoPhillips, Houston, TX (one-half day).
18. McLennan, J.D. 2008. Introduction to Oil and Gas, Short Course to Lundin Oil Company – Ethiopia Office. Addis Ababa, Ethiopia, Oct. 14-16.
19. McLennan, J.D. 2008. Short Course to Lundin Oil Company – Kenya Office. 2008. Introduction to Oil and Gas, Nairobi, Kenya, Oct. 17-18.

# Refereed Journal Publications

1.
2. Tang, X. Yan, H., Zhu, H., Dusseault, M.B., **McLennan, J.D.**, Li, K., Xiao, J., Zeng, B., Zheng, M., Lin, L., and Liu, W. 2023. Investigation on Well Interferences of Infill Well Fracturing in Shale Gas Reservoirs across Sichuan Basin, Submitted to Rock Mechanics Rock Engineering, under review.
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# Peer-Reviewed Conference Publications

1. Moore, J., **McLennan, J.**, et al. 2023. Current activities at the Utah Frontier Observatory for Research in Geothermal Energy (FORGE): A Laboratory for Characterizing, Creating and Sustaining Enhanced Geothermal Systems. American Rock Mechanics Association, ARMA-2023-0749, presented at the 57th U.S. Rock Mechanics/Geomechanics Symposium, June 25–28, 2023, <https://doi.org/10.56952/ARMA-2023-0749>.
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31. Bradford, J., Moore, J., Ohren, M., **McLennan, J.**, Osborn, W.L., Majer, E., Nash, G., and Friefeld, B. 2015, Recent Thermal and Hydraulic Stimulation Results at Raft River, ID EGS Site, Fortieth Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, California, February 2015, SGP-TR-202.
32. Stoddard, T., Birgenheier, L., **McLennan, J.**, and Wriedt, J. 2013. Mancos Shale In-situ Stress Estimation and Fracture Simulation Across the Uinta Basin, 2013 AAPG Rocky Mountain Section Meeting, Salt Lake City, UT, September.
33. Stoddard, T., Birgenheier, L., Ryan Hillier, Larsen, L., and **McLennan, J.** 2013. Log-Interpreted Reservoir Potential from Cretaceous Mancos Shale in the Uinta Basin, 2013 AAPG Rocky Mountain Section Meeting, Salt Lake City, UT, September.
34. Bhide, R., Deo, M., **McLennan, J.**, and Stoddard, T. 2013. Modeling Hydraulic Fracture Interactions with Natural Fractures, 2013 AAPG Rocky Mountain Section Meeting, Salt Lake City, UT, September.
35. Bereskin, S.R., Chidsey, T.C., Morgan, C.D., and **McLennan, J.** 2013. Hydrocarbon Potential of the Chainman Shale, Western Utah, 2013 AAPG Rocky Mountain Section Meeting, Salt Lake City, UT, September.
36. Birgenheier, L., Larsen, L., McCauley, A.D., **McLennan, J.**, Ressetar, R., and Horton, B. 2013. An Integrated, Core-Focused Facies and Stratigraphic Model of the Mancos Shale, Uinta Basin, 2013 AAPG Rocky Mountain Section Meeting, Salt Lake City, UT, September.
37. Birgenheier, L., Horton, B., Larsen, L., McCauley, A.D., **McLennan, J.**, and Ressetar, R. 2013. A Facies and Sequence Stratigraphic Model for the Mancos Shale, Uinta Basin: Identifying Unconventional Horizontal Targets, 2013 AAPG Rocky Mountain Section Meeting, Salt Lake City, UT, September.
38. **McLennan, J.D.** 2013. Hydraulic Fracturing Complexity - Interaction between Hydraulic and Natural Fractures, AAPG Geosciences Technology Workshop, Geomechanics and Reservoir Characterization of Shales and Carbonates, Baltimore, Maryland, July 16-17.
39. **McLennan, J.D.** 2013. EGI Presentation to Utah-Europe Days, Utah Governor's Office of Economic Development Utah-Europe Days 2013, May 9.
40. Bradford, J., **McLennan, J.**, Moore, J., Glasby, D. Waters, D., Bailey, A., Rickard, W., Bloomfield, K., Kruwell, R., and King, D. 2013. Recent Developments at the Raft River Geothermal Field, SGP-TR-198, Proc. Thirty-Eighth Workshop on Geothermal Reservoir Engineering, Stanford University, Stanford, California, February 11-13.
41. **McLennan, J.D.** 2013. Energy: An Integral Policy Component, 2013 Legislative Policy Summit, Salt Lake City, UT, January 23.
42. **McLennan, J.D.** 2013. How Technology is Changing Energy Development Around the World, Governor's Energy Summit, Salt Lake City, UT, January 10.
43. Horton, B., Birgenheier, L., Johnson, C., Rowe, H., Kennedy, A. and **McLennan, J.** 2012. Litho- and Chemofacies of the Mancos Shale – Possible Predictors of Geomechanical Behavior of a Developing Shale Gas Play, AAPG ACE, Long Beach, CA April 22-25.
44. Green, S. and **McLennan, J.** 2012. Hydraulic Fracturing Mineback Experiment in Complex Media, AGU Fall Meeting, Session H032 on “Underground Testing, Monitoring, and Modeling in Different Media", San Francisco, CA, December 3-7.
45. Moore, J. and **McLennan, J.** 2012. Case Studies: Concept Testing and Development at the Raft River Geothermal Field, Idaho, GRC Stimulation Workshop, Reno, NV., Sept. 29.
46. **McLennan, J.** 2012. Gas Shale and Geothermal Stimulation: Where We Are? GRC Stimulation Workshop, Reno, NV., Sept 28.
47. **McLennan, J.**, Sewell, J., and Tran, T. 2012. USTAR Fossil Energy Poster, Salt Lake City.
48. **McLennan, J.D.** 2012, Energy from Unconventional Fuels in Utah, Utah Society of Professional Engineers Continuing Education Conference, Salt Lake City, UT, May 12.
49. **McLennan, J.D.** 2012. Hydraulic Fracturing, American Gas Association, Financial Forum, Scottsdale, AZ, May 6-8.
50. **McLennan, J.D.** 2012. Underbalanced and Managed Pressure Drilling SPE/SEG Joint Workshop on Pore Pressure Prediction - Discussion Leader, Phuket, Thailand, February 23.
51. **McLennan, J.D.**, 2012. Hydraulic Fracturing, 2012. Utah Energy Development Summit, Salt Lake City, UT, Feb. 15.
52. **McLennan, J.** 2011. Changing the Role of Fractures. Workshop on Evolution of the Mental Picture of Tight Shales, Warsaw, Poland, March 28-29.
53. Dusseault, M., with contributions from **McLennan, J.** 2011. Massive Multi-Stage Hydraulic Fracturing: Where are We? ARMA (American Rock Mechanics Association) e-Newsletter, Winter 2011.
54. Zhao, N., **McLennan, J.**, and Deo, M.D. 2011. Morphology and Growth of Fractures in Unconventional Reservoirs, CSUG/SPE 147509, Canadian Unconventional Resources Conference, Calgary, AB, November 15–17.
55. Zhao, N., **McLennan, J.** and Deo, M.D. 2011. Morphology and Growth of Fractures in Unconventional Reservoirs, AIChE Annual Meeting: Minneapolis, MN.
56. Thakur, S., Deo, M.D. and **McLennan, J.** Role of Discrete Fracture Network in Tight Gas Reservoirs, AIChE Annual Meeting, Minneapolis, MN.
57. Deo, M., **McLennan, J.** and Levey, R. 2011. Energy from Unconventional Fuels: Resource Assessment and Sustainable Production Technologies. 7th Convention of Indian Geological Congress and International Conference on “New Paradigms of Exploration and Sustainable Mineral Development: Vision 2050 (NPESMD 2011),” Indian School of Mines Dhanbad, November 10.
58. Brinton, D., Moore, J., **McLennan, J.,** and Jones, C. 2010. Predicting Thermal Conductivity of Geothermal Reservoir Rocks, AIChE Annual Meeting, Salt Lake City, Utah, November 8.
59. **McLennan, J.** 2010. Modeling Fluid Invasion and Hydraulic Fracture Propagation in Fractured Hydrocarbon Reservoirs, SPE/AAPG Joint Workshop: Naturally Fractured Reservoirs, Vail, CO., October 4-6.
60. **McLennan, J.** 2010 Modeling Fluid Invasion and Hydraulic Fracture Propagation in Naturally Fractured Rock, Wyoming Geological Association Annual Meeting, Casper, WY, June 8.
61. **McLennan, J.** Enhanced In-Situ Production Through Fracturing, 2010 Unconventional Fuels Conference: Production of Fuels from Oil Shale, Oil Sands, and Coal, University of Utah, Salt Lake City, Utah, April 28.
62. **McLennan, J.**, Tran, D., Zhao, N., Thakur, S. Deo, M., Gil, I., and Damjanac, B. 2010. Modeling Fluid Invasion and Hydraulic Fracture Propagation in a Naturally Fractured Rock, a Three Dimensional Approach, SPE 12788, 2010 SPE International Symposium and Exhibition on Formation Damage Control, Lafayette, Louisiana, USA, February 10-12.
63. Bai, M., **McLennan, J.** and Standifird, W. 2009. An Alternative Method for Predicting Injectivity Decline in Produced Water Re-injection, SPE 120829, for presentation at the 2009 SPE European Formation Damage Conference, Scheveningen, The Netherlands, May 27-29.
64. **McLennan, J.D.**, Guo, Q., Wang, C., Geehan, T., Martin, W. and Marquardt, J. 2008. A Laboratory Study on Increased Assurance and Understanding Storage Mechanisms of E&P Waste Injection into an Unconsolidated Formation,” SPE 111707, SPE International Conference on Health, Safety, and Environment in Oil and Gas Exploration and Production, Nice, France, April 15-17.
65. Suarez-Rivera, R., Green, S.J., **McLennan, J.D.,** and Bai. M. 2006. Effect of Layered Heterogeneity on Fracture Initiation in Tight Gas Shales, SPE 103327-MS, SPE ATCE, San Antonio, Texas, September 24-27.
66. Palmer, I.D., Vorpahl, D.G., Glenn, J.M., Vaziri, H. and **McLennan, J.D.** 2004. A Recent Gulf of Mexico Cavity Completion, SPE 86462, SPE International Symposium and Exhibition on Formation Damage Control, Lafayette, Louisiana, February 18-20.
67. Abou-Sayed, A.S., Guo, Q., Wang, G., **McLennan, J.D.** and Zaki, K. 2002. Challenges for Monitoring and Verification of Drill Cuttings Reinjection Performance, SPE/ISRM 78186, 2002 SPE/ISRM 2002 Rock Mechanics Conference, Irving, Texas, October 20-23.
68. **McLennan, J.D.** and Abou-Sayed, A.S. 2002. Some Advances in Near Wellbore Geomechanics, SPE/ISRM 78194, SPE/ISRM 2002 Rock Mechanics Conference, Irving, Texas, October 20-23.
69. Hagan, J.T., Murray, L.R., Meling, T., Guo, Q., **McLennan, J.D.**, Abou-Sayed, A.S., and Kristiansen, T.G. 2002. Engineering and Operational Issues Associated with Commingled Drill Cuttings and Produced Water Re-Injection Schemes, SPE 73918, 2002 SPE International Conference on Health, Safety and Environment in Oil and Gas Exploration and Production, Kuala Lumpur, Malaysia, March 20-22.
70. Vaziri, H.H., Lemoine, E., Palmer, I.D., **McLennan, J.D.** and Islam, R. 2000. How Can Sand Production Yield a Several-Fold Increase in Productivity: Experimental and Field Data?, SPE 63235, 2000 SPE Annual Technical Conference and Exhibition, Dallas, TX, October 1-4.
71. Abou-Sayed, A.S., Guo, Q., **McLennan, J.D.** and Hagan, J.T. 2000. Case Studies of Waste Disposal Through Hydraulic Fracturing, 2000 North American Rock Mechanics Symposium Workshop on Three-Dimensional and Advanced Hydraulic Fracture Modeling, Seattle, WA, July 29.
72. Guo, Q., Dutel, L.J., Wheatley, G.B., **McLennan, J.D.** and Black, A.D. 2000. Assurance Increased for Drill Cuttings Re-Injection in the Panuke Field Canada: Case Study of Improved Design, IADC/SPE 59118, 2000 IADC/SPE Drilling Conference, New Orleans, LA, February 23-25.
73. Palmer, I.D., **McLennan, J.D.** and Vaziri, H.H. 2000. Cavity-Like Completions in Weak Sands, SPE 58719, 2000 International Symposium on Formation Damage Control, Lafayette, LA, February 23-24.
74. Khodaverdian, M.F., Abou-Sayed, A.S., Ramos, R., Guo, Q. and **McLennan, J.D.** 1998. Laboratory Simulation of Liner Loading and Near-Wellbore Permeability Variation in Poorly Consolidated Sandstones, SPE 47291, 1998 SPE/ISRM Eurock ‘98, Trondheim, Norway, July 8-10.
75. Vásquez, A.R., Sánchez, M.S., **McLennan, J.D.**, Guo, Q., Portillo, F., Poquioma, W., Blundun, M. and Mendoza, H. 1999. Mechanical and Thermal Properties of Unconsolidated Sands and its Application to the Heavy Oil SAGD Project the Tia Juana Field, Venezuela, SPE 54009, 1999 SPE Latin American and Caribbean Petroleum Engineering Conference, Caracas, Venezuela, April 21-23.
76. Mitlin, V.S., Lawton, B.D. and **McLennan, J.D.** 1998. Improved Estimation of Relative Permeability from Displacement Experiments, SPE 39830, 1998 SPE International Petroleum Conference and Exhibition of Mexico, Villahermosa, Mexico, March 3-5.
77. Palmer, I.D., Vaziri, H.H., **McLennan, J.D.** and Khodaverdian, M.F. 1995. Openhole Cavity Completion in Coalbed Methane Wells – Modeling of Field Data, INTERGAS ’95, Unconventional Gas Symposium, Tuscaloosa, AL, May 15-19.
78. Palmer, I.D., Vaziri, H.H., Khodaverdian, M.F., **McLennan, J.D.**, Prasad, K.V.K., Edwards, P., Brackin, C., Kutas, M. and Fincher, R. 1995. Completions and Stimulations for Coalbed Methane Wells, SPE 30012, 1995 International Meeting on Petroleum Engineering, Beijing, China, November 14-17.
79. Khodaverdian, M.F., **McLennan, J.D.** and Jones, A.H. 1994. Hydraulic Fracture Stimulation for Enhanced Recovery of Coalbed Methane, 1994, 8th International Conference of the International Association for Computer Methods and Advances in Geomechanics, Morgantown, WV, May 22-28.
80. Olszewski, A.J., Zuber, M.D., Schraufnagel, R.A. and **McLennan, J.D.** 1993. Integration of Log, Core and Well Test Data Improves Coalbed Methane Reservoir Evaluation, 1993 International Coalbed Methane Symposium, Tuscaloosa, AL, May 17-21.
81. Greaves, K.H., Owen, L.B., **McLennan, J.D.** and Olszewski, A.J. 1993. Multi-Component Gas Adsorption-Desorption Behavior of Coal, 1993 International Coalbed Methane Symposium, Tuscaloosa, AL, May 17-21.
82. Khodaverdian, M.F. and **McLennan, J.D.** 1993. Cavity Completions: A Study of Mechanics and Applicability, 1993 International Coalbed Methane Symposium, Tuscaloosa, AL, May 17-21.
83. Zheng, Z., **McLennan, J.D.**, Jones, A.H. and Spafford, S. 1992. Pore Volume Compressibility and Permeability of Coal Under Different Stress Conditions, Proc. 1992 International Gas Research Conference, Orlando, FL, November 16-18.
84. Khodaverdian M.K. and **McLennan, J.D.** 1992. Hydraulic Fracturing Coalbed Methane Reservoirs: Obstacles and Solutions, Proc. 1992 International Gas Research Conference, Orlando, FL, November 16-18.
85. Van den Hoek, P.J., Kooijman, A.P., Kenter, C.J., Khodaverdian, M., Hyland, C.R. and **McLennan, J.D.** 1992. Size-Dependency of Hollow Cylinder Collapse Strength,” Proc. SPE 1992 Fall Meeting, SPE 24800, Washington, D.C.
86. Zheng, Z., Khodaverdian, M.K. and **McLennan, J.D.** 1991. Static and Dynamic Testing of Coal Specimens, paper SCA 9120, 1991.
87. Mavor, M.J., Dhir, R., **McLennan, J.D.** and Close, J.C. 1991. Evaluation of the Hydraulic Fracture Stimulation of the No. 9 Well, San Juan Basin, Coalbed Methane, (1991) Rocky Mountain Association of Geologists.
88. Khodaverdian, M., **McLennan, J.D.**, Jones, A.H. and Schraufnagel, R.A. 1991 Influence of Near Wellbore Effects on Treatment Pressure in Coal, 1991 Coalbed Methane Symposium, Tuscaloosa, AL, May 13-16.
89. Zheng, Z., **McLennan, J.D.,** and Jones, A.H. 1990. Pore Volume Compressibilities Under Different Stress Conditions, 1990 SCA Conference Paper No. 9005, Dallas, TX, August.
90. Morales, R.H., **McLennan, J.D.**, Jones, A.H. and Schraufnagel, R.A. 1990. Classification of Treating Pressure in Coal Fracturing, 31st U.S Rock Mechanics Symposium, Boulder, CO, June.
91. Economides, M.J., **McLennan, J.D.**, Roegiers, J-C. and Brown, E. 1989. Fracturing of Highly Deviated and Horizontal Wells, paper 89-40-39, 1989 Annual Technical Meeting of the Petroleum Society of CIM, Banff, May 28-31.
92. Jeffrey, R.G., Hinkel, J.J., Nimerick, K.H. and **McLennan, J.D.** 1989. Hydraulic Fracturing to Enhance Production of Methane from Coal Seams, Proc. 1989 Coalbed Methane Symposium, The University of Alabama/Tuscaloosa, April.
93. Detournay, E., Cheng, A.H.-D., Roegiers, J-C. and **McLennan, J.D.** 1988. Poroelastic Considerations in In-Situ Stress Determination by Hydraulic Fracturing, 2nd International Workshop on Hydraulic Fracturing Stress Measurement, Minneapolis, MN, June.
94. Baumgartner, J., Carvalho, J. and **McLennan, J.** 1989. Fracturing Deviated Boreholes: An Experimental Laboratory Approach, IS-1989-117, ISRM International Symposium, A.A. Balkema, Pau, France, August 30 - September 2.
95. Detournay, E., **McLennan, J.** and Roegiers, J-C. 1986. Poroelastic Constants Explain Some of the Hydraulic Fracturing Mechanisms,” Proc. Unconventional Gas Technology Symposium, SPE 15262, Louisville, KY.
96. **McLennan, J.D.**, Roegiers, J-C., Marcinew, R.P. and Erickson, D.J. 1983. Rock Mechanics Evaluation of the Cardium Formation, 83-34-38, 34th Annual Meeting of CIM, Banff, AB, May 10-13.
97. **McLennan, J.D.**, Roegiers, J-C. and Marx, W.P. 1983. The Mancos Formation: An Evaluation of the Interaction of Geological Conditions, Treatment Characteristics and Production, SPE 11606, Low Permeability Symposium, Denver, CO, March 14-16.
98. **McLennan, J.D.** and Roegiers, J-C. 1982. How Instantaneous Are Instantaneous Shut-in Pressures, SPE 11064, 57th SPE Annual Fall Technical Conference and Exhibition, SPE/AIME, New Orleans, LA, September 1982.
99. **McLennan, J.D.**, Elbel, J., Mattheis, E. and Lindstrom, L. 1982. A Critical Evaluation of the Mechanical Properties Log (MPL) on a Basal Quartz Well in the Caroline Area, 82-33-45, 33rd Annual General Meeting of CIM, Calgary, AB, June.
100. Roegiers, J-C. and **McLennan, J.D.**: 1981. Factors Influencing the Initiation Orientation of Hydraulically Induced Fractures, Workshop on Hydraulic Fracturing Stress Measurement, Monterey, CA, December.
101. **McLennan, J.D.** and Roegiers, J-C. 1981. Do Instantaneous Shut-in Pressures Accurately Represent the Minimum Principal Stress, Workshop on Hydraulic Fracturing Stress Measurement, Monterey, CA, December.
102. Roegiers, J-C. and **McLennan, J.D.** 1978. Rock Mechanics Problems Associated with Hot Dry Rock Geothermal Energy Extraction, Proc. Hot Dry Rock Geothermal Workshop, Los Alamos Scientific Laboratory, Los Alamos, New Mexico, LA-7470-C, April.
103. **McLennan, J.D.** and Roegiers, J-C. 1976. Stress Conditions Around the Niagara Gorge, Proc. 3rd Symp. Eng. Applications to Solid Mechanics, Toronto, ON.

# Presentations and Seminars Since 2010 (Academic/Industry/Public)

1. **McLennan, J.** 2023. FORGE Status and Upcoming Activities, Presentation to SLB Geothermal Group, Salt Lake City, UT, November 16.
2. **McLennan, J.** 2023. Geothermal Energy: An Overview of Opportunities, Presentation to Halliburton Fellows and Distinguished Engineers, November 9, online
3. **McLennan, J.**, 2023. Resilient Energy Program - University of Utah, panelist in Energy Transition Educators Forum, King Fahd University of Petroleum and Mining, Al Khobar, Saudi Arabia, October 29.
4. **McLennan, J.** 2023. Informal FORGE presentation to Brett Ackerman - Colorado Energy Commissioner, October 18, Salt Lake City, Utah.
5. **McLennan, J.** 2023. FORGE (Frontier Observatory for Research in Geothermal Energy) Presentation to Cascade Institute, September 28.
6. **McLennan, J.** 2023. Panelist, Congressman John Curtis' Conservative Climate Summit September 8th, Utah Valley University, Orem, Utah.
7. **McLennan, J.** 2023. FORGE (Frontier Observatory for Research in Geothermal Energy), EGI Annual Meeting, Salt Lake City, Utah, September 19.
8. **McLennan, J.** and England, K. 2023. Utah FORGE: Recent Drilling and Circulation Testing, FORGE, Modeling and Simulation Forum, August 16. <https://www.youtube.com/watch?v=b2_xbPmEK5I>.
9. **McLennan, J.** 2023. Utah FORGE – Project Update, NSI On-Line Seminar Series, August 1.
10. **McLennan, J.** 2023. Geothermal Energy – An Opportunity at Any Temperature, Online presentation to AIChE, Environmental Division, July 31.
11. **McLennan, J.** 2023. FORGE: Recent Updates, In-person presentation to Chevron, Salt Lake City, UT, July 31.
12. **McLennan, J.** 2023. FORGE, In-person overview and rig tour to UT Governor Cox and CO Governor Polis, Milford, Utah, June 9.
13. **McLennan, J.** 2023. FORGE, In-person overview and rig tour to Alejandro Moreno, acting assistant secretary for the U.S. Department of Energy’s (DOE) Office of Energy Efficiency and Renewable Energy, May 25.
14. **McLennan, J.** 2023. FORGE Status and Upcoming Activities, Presentation to Schlumberger Geothermal Group, Salt Lake City, UT, February 17.
15. **McLennan, J.** 2022. FORGE (Frontier Observatory for Research in Geothermal Energy, The 8th Geophysical Youth Forum of the Liaoning Geophysical Society & International CCUS Technical Seminar, online, November 12.
16. **McLennan, J.** 2022. FORGE (Frontier Observatory for Research in Geothermal Energy, E3 Student Conference and Exhibition, online presentation, November 2.
17. **McLennan, J.** 2022. Drilling and Stimulation Activities at Utah FORGE DEEP Workshop, in-person, Salt Lake City, UT, September 29.
18. **McLennan, J.** 2022. Utah FORGE: Lessons Learned and Anticipated Technology Challenges, Presentation to BP, online, September 25.
19. **McLennan, J.** 2022. Overview of 2022 Stimulation and What’s Next including Operational Needs, Seismic Workshop, University of Utah, September 21.
20. **McLennan, J.** 2022. FORGE Challenges and Outlook, EGI Corporate Associates Meeting, September 21.
21. **McLennan, J.** 2022. Deeper Geothermal Prospects, Boise State University, online, September 20.
22. **McLennan, J.** 2022. Utah FORGE: Lessons Learned and Anticipated Technology Challenges, presentation to ICDP, online, August 22.
23. **McLennan, J.** 2022. FORGE Stimulation Activities, FORGE Modeling and Simulation Forum, online, June 22.
24. **McLennan, J.** 2022. FORGE Update and Lookahead, online presentation to ENI, May 31.
25. **McLennan, J.** 2022. Utah FORGE (Frontier Observatory for Research in Geothermal Energy): Status and Lookahead, Think GeoEnergy Webinar, May 27.
26. **McLennan, J.** 2022.Advancements and Opportunities in the Geothermal Industry, Belgian Delegation to Utah, April 25, Salt Lake City, UT.
27. **McLennan, J.** 2021. Advancements in the Geothermal Industry Attributed to Oilfield Technologies, SPE Hydraulic Fracturing Technical Section, Virtual, April 14.
28. **McLennan, J.** 2020. Historical Perspective, Upcoming Activities, Modeling and Simulation; FORGE Utah, CouFrac 2020, ISRM Specialized Conference, International Conf. on Couple Processes in Fractured Geological Media: Observation, Modelling and Application, Seoul, Korea, November 11-13.
29. **McLennan, J.D.** 2019. FORGE in 2019. 2019 ARMA-CUPB Geothermal International Conference, August 5-8, Beijing, China.
30. **McLennan, J.** 2019. Basic Geomechanics Considerations in Drilling Geothermal Wells, 2019 ARMA-CUPB Geothermal International Conference, August 5-8, Beijing.
31. **McLennan, J.D.** 2016. EGS Opportunities and Challenges: Utah Forge, GRC Workshop, Sacramento, CA November 19.
32. **McLennan, J.D.** 2016. EGS Opportunities and Challenges: Utah Forge, China University of Petroleum, Beijing, China, November 27.
33. **McLennan, J.D.** 2013. EGI Presentation to Utah-Europe Days, Utah Governor's Office of Economic Development Utah-Europe Days 2013, May 9.
34. **McLennan, J.** 2013. Mathematical Models in Hydraulic Fracturing: Models and Input, Environmental Impacts of Shale Gas Development, by university Consortium for Field-Focused Groundwater Research, Calgary, AB, April 18-19.
35. Lighty, J., Deo, M., and **McLennan, J.D.** 2012. Petroleum Engineering in the Chemical Engineering Department, presentation to Dr. Jeff Spath, V.P Schlumberger, Incoming SPE President, Salt Lake City, UT, December 14.
36. **McLennan, J.D.** 2013. EGI Presentation to Utah-Europe Days, Utah Governor's Office of Economic Development Utah-Europe Days 2013, May 9.
37. **McLennan, J.D.** 2012. Numerical Applications Using Uintah, presentation to Dr. Jeff Spath, V.P. Schlumberger, Incoming SPE President, Salt Lake City, UT, December 14.
38. **McLennan, J.D.** 2012. Hydraulic Fracturing, Brigham Young University, Geology for Engineers, December 4.
39. **McLennan, J.D.** 2012. University of Utah's PE and Unconventional Engineering and Future Collaboration with China University of Petroleum, presentation to China University of Petroleum Administrators and Faculty, Salt Lake City, Utah, December 2.
40. **McLennan, J.** 2012. South American Shale Gas & Shale Oil Plays, Phase 1 Sponsor Update & Final Review, EGI, Salt Lake City, UT, September 11.
41. **McLennan, J.** 2011. Changing the Role of Fractures. Workshop on Evolution of the Mental Picture of Tight Shales, Warsaw, Poland, March 28-29.
42. **McLennan, J.** 2011. Deep-water Drilling: The Gulf Oil Spill. Invited Talk/Keynote, presented, AIChE Dinner Meeting February 15.
43. **McLennan, J.** 2010. Modeling Fluid Invasion and Hydraulic Fracture Propagation in Fractured Hydrocarbon Reservoirs, SPE/AAPG Joint Workshop: Naturally Fractured Reservoirs, Vail, CO., October 4-6.
44. **McLennan, J.** 2010. Modeling Fluid Invasion and Hydraulic Fracture Propagation in Naturally Fractured Rock, Wyoming Geological Association Annual meeting, Casper, WY, September 6.
45. **McLennan, J.** 2010. Is Anything Missing, EGI-Schlumberger Shale Gas Summit, London, UK, June 9-10.
46. **McLennan, J.** 2010. Enhanced In-Situ Production Through Fracturing, Presentation: 2010 Unconventional Fuels Conference: Production of Fuels from Oil Shale, Oil Sands, and Coal, April 28, University of Utah, Salt Lake City, Utah.
47. **McLennan, J.** 2013. Current Topics (in Fracturing and Completions in Low-Mobility Reservoirs) That Are Usually Thrown Under the Bus, presentation to EnCana, Denver, Co, June 13.
48. **McLennan, J.** 2013. Current Topics (in Fracturing and Completions in Low-Mobility Reservoirs) That Are Usually Thrown Under the Bus, presentation to EnCana, Plano, TX, June 12.
49. Walton, I., and **McLennan, J.** 2013. Recent Developments in Unconventional Gas and Liquids Research, presentations to Beach Energy, Adelaide, Australia, May 16.
50. Walton, I., and **McLennan, J.** 2013. Recent Developments in Unconventional Gas and Liquids Research, presentations to Santos Petroleum, Adelaide, Australia, May 15.
51. Walton, I., and **McLennan, J.** 2013. Recent Developments in Unconventional Gas and Liquids Research, presentations to AGL, Sydney, Australia, May 14
52. Walton, I., and **McLennan, J.** 2013. Recent Developments in Unconventional Gas and Liquids Research, presentations to AWE, Sydney, Australia, May 13.
53. **McLennan, J.D.** 2013. Shale Geomechanics: Developing Research Programs, presentation to Saudi Aramco Engineers and Geologists, Salt Lake City, UT, May 10.
54. **McLennan, J.** 2013. Current Topics (in Fracturing and Completions in Low-Mobility Reservoirs) That Are Usually Thrown Under the Bus, presentation to Nexen Inc., Calgary, AB, April 17.
55. **McLennan, J.** 2013. Current Topics (in Fracturing and Completions in Low-Mobility Reservoirs) That Are Usually Thrown Under the Bus, presentation to EnCana, Calgary, AB, April 17.
56. **McLennan, J.** 2013. Current Topics (in Fracturing and Completions in Low-Mobility Reservoirs) That Are Usually Thrown Under the Bus, presentation to Talisman Energy, Inc., Calgary, AB, April 17.
57. Xian, S., and **McLennan, J.D.** 2013. Conceptual Methodology for Hydraulic Fracture Design and Production Forecasting, presentation to EGI Corporate Associates, April 11.
58. **McLennan, J.** 2013. Geomechanical Considerations Chinese Shales, presentation to EGI Corporate Associates, Salt Lake City, April 11.
59. **McLennan, J.D.** 2013. Geomechanical Considerations, South American Shales, presentation to EGI Corporate Associates, April 8.
60. **McLennan, J.** 2013. Low Mobility Resources, presentation to Chinese Geological Survey, Salt Lake City, UT, January 28.
61. **McLennan, J.** 2012. Geomechanics Initiatives, presentation to Occidental Petroleum, Salt Lake City, UT, November 27.
62. **McLennan, J.** 2012. Low Mobility Resources, presentation to CNOOC, Salt Lake City, UT October 23.
63. **McLennan, J.** 2012. Low Mobility Resources, presentation to PetroChina, Salt Lake City, UT, September 27.
64. **McLennan, J.** 2012. Geomechanics Initiatives, presentation to CSIRO, Salt Lake City, UT, September 26.
65. **McLennan, J.** 2012. Hydraulic Fracturing: Facts About Fracs. Questar Gas Customer Meeting, September 12.
66. **McLennan, J.** 2012. Gas production Forecasting from Tight Gas Reservoirs: Integrating natural Fracture networks and Hydraulic Fractures, presentation to Golder Associates, Salt Lake City, UT, August 9.
67. **McLennan, J.** 2012. Near‐Wellbore Completion Considerations for Low Mobility, Indurated Formations, BP Completions Engineers Luncheon, Houston, TX, August 3.
68. **McLennan, J.** 2012. Geomechanics Initiatives at EGI, presentation to Seneca Resources, Salt Lake City, UT, May.
69. Tran, T. and **McLennan, J.** 2012. Geomechanical Reservoir State of Kerogen-Bearing Rock, presentation to Statoil, Salt Lake City, UT. May 7.
70. **McLennan, J.** 2012. Hydraulic Fracturing, presentation to CNOOC, April 2012, Salt Lake City, UT, April 13.
71. **McLennan, J.** 2012. Geomechanics Initiatives, presentation to CSIRO, Salt Lake City, UT, February 7.
72. **McLennan, J.** 2012. Shale Drilling and Hydraulic Fracturing, presentation to CNOOC, Salt Lake City, UT, December 6.
73. **McLennan, J.** 2011. Integrated Geoscience and Geomechanics at EGI, Presentation to BP Americas, September 7.
74. **McLennan, J.** 2011. Integrated Geoscience and Geomechanics at EGI, Presentation to ROC Oil, Sydney, AU, August 2011.
75. **McLennan, J.** 2011. Integrated Geoscience and Geomechanics at EGI, Presentation to AWE, Sydney, AU, August 2011.
76. **McLennan, J.** 2011. Integrated Geoscience and Geomechanics at EGI, Presentation to Santos, Adelaide, AU, August 2011.
77. **McLennan, J.** 2011. Integrated Geoscience and Geomechanics at EGI, Presentation to Beach Petroleum, Adelaide, AU, August 2011.
78. **McLennan, J.** 2011. Integrated Geoscience and Geomechanics at EGI, Presentation to Strike Petroleum, Adelaide, AU, August 2011.
79. **McLennan, J.** 2011. Integrated Geoscience and Geomechanics at EGI, Presentation to ICON, Brisbane, AU, August 2011.
80. **McLennan, J.** 2011. Integrated Geoscience and Geomechanics at EGI, Presentation to Woodside Oil, Perth, AU, August 2011.
81. **McLennan, J.** 2011. Integrated Geoscience and Geomechanics at EGI, Presentation to Central Petroleum, Perth, AU, August 2011.
82. **McLennan, J.D.** 2011. Coupled Reservoir Simulation for EOR, presentation to Maersk Oil, May 9.
83. **McLennan, J.** 2011. Integrated Geoscience & Geomechanics Initiatives at the University of Utah, Presentation to ConocoPhillips Inc., Jan 28.
84. **McLennan, J.** 2010. Improved Technologies for Finding an Economic Shale Gas System, Presentation to British Gas, London.
85. **McLennan, J.** 2010. Hydraulic Fracturing Simulators, Presentation to EnCana, Salt Lake City, UT, December 17.
86. **McLennan, J.** 2010. Deepwater Geomechanics, presentation to PetroChina, Salt Lake City, UT, November 18.

# Patents and Disclosures

1. Periodic Symmetry Defined Bioreactors, Inventors: Leonard F. Pease, Swomitra K. Mohanty, **John D. McLennan**, Anthony Butterfield, Samuel Doane, Rete Browning, Tyler Lee, Assignee: The University of Utah, Country: United States, 9,790,459 B2.
2. Encapsulated Porous Proppant, Inventors: Kyu-Bum Han, John Fuertez, **John D. McLennan**, Taylor David Sparks, Assignee: The University of Utah, Country: United States, 10,190,041.
3. Fracture Network Systems and Methods of Forming the Same, Pei Jian Li, **J.D. McLennan**, J.N. Moore, November 6, 2023, Docket No. 311474US01 507896-32.
4. Heat Exchangers, Systems and Methods of Using the Same, P. ASAI, P. Asai, **J.D. McLennan**, Milind Deo, February 3, 2023, Docket No. 306745US01 507896-33.

# University Committee Memberships

|  |  |
| --- | --- |
| University Academic Centers and Institutes Steering Committee | from 2021 |
| Graduate Committee, Department of Chemical Engineering | from 2012 |
| University Research Committee | 2017-present |
| Co-Chair of Bio-Nanotechnology Search Committee for the Department of Chemical Engineering | 2016 |
| Member Search Committee for Petroleum Engineering faculty (one position) within the Department of Chemical Engineering | 2013 |
| Member Search Committee for Nuclear Engineering faculty (two positions) within the Department of Civil and Environmental Engineering, and Department of Chemical Engineering | 2013 |

# Recent Service

|  |  |
| --- | --- |
| Member ARMA Fiber Optics Workshop Organizing Committee for June 2023 Meeting | 2022-2023 |
| Member ARMA Fiber Optics Workshop Organizing Committee for June 2022 Meeting | 2021-2022 |
| Chair ARMA Hydraulic Fracturing Technical Committee | 2021-2023 |
| Co-organizer of the 2019 ARMA CUPB Workshop on Geothermal Energy, Beijing | August 2019 |
| Chair, Strategic Planning Committee, American Rock Mechanics Association | 2018-2019 |
| Co-organizer of the 2018 ARMA-DGS Workshop, Bahrain | April 2018 |
| Organizer: SEDHEAT: Unlocking the Energy Elephant. This is part of the NSF SedHeat Workshop Series related to Science and Engineering for Geothermal Energy in Sedimentary Basins | March 2017 |
| Co-organizer of The 5th International Conference on Coupled Thermo-Hydro-Mechanical-Chemical (THMC) Processes in Geosystems (GeoProc): Petroleum and Geothermal Reservoir Geomechanics and Energy Resource Extraction | 2015 |
| Co-Chair of American Rock Mechanics Association Workshop on Visualization, Salt Lake City, Spring 2014 | 2014 |
| Co-Chairman for Symposium on Effective and Sustainable Hydraulic Fracturing, Brisbane, Australia | May 2013 |
| Chair of American Rock Mechanics Association Forum on Rheology, Salt Lake City, March 2013 | March 2013 |
| Membership Committee, Society of Petroleum Engineers | 2012-2013 |
| Graduate Committee, Department of Chemical Engineering | From 2012 |
| Membership Committee, Society of Petroleum Engineers | From 2012 |
| Board Positions, Society of Petroleum Engineers, Salt Lake Petroleum Section | Ongoing |
| Co-Chairman of the 2010 American Rock Mechanics Association Annual Meeting, Salt Lake City, June 2010. Approximately 500 attendees | June 2010 |
| Organizing Committee for SPE Reservoir Geomechanics Forum, Colorado Springs, CO | June 2008 |