

Dr. Clayton V. Deutsch, P.Eng.

Professor, School of Mining and Petroleum Engineering
Canada Research Chair in Natural Resources Uncertainty Management
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Dr. Deutsch is a Professor in the Department of Civil & Environmental Engineering at the University of Alberta. He teaches and conducts research into better ways to model heterogeneity and uncertainty in petroleum reservoirs and mineral deposits. Prior to joining the University of Alberta, Dr. Deutsch was an Associate Professor (Research) in the Department of Petroleum Engineering at Stanford University and Director of the Stanford Center for Reservoir Forecasting (SCRF). His employment history includes three years with Exxon Production Research Company as a Research Specialist in the Reservoir Division and three years of experience with Placer Dome Inc. conducting ore reserve valuations. Dr. Deutsch has published seven books, over 175 peer-reviewed technical papers, and over 140 papers in conference proceedings. He has taught over 200 short courses for industry and over 80 University classes. Dr. Deutsch holds the Canada Research Chair in Natural Resources Uncertainty Characterization and the Alberta Chamber of Resources Industry Chair in Mining Engineering.

Education:

- Doctor of Philosophy, Applied Earth Sciences (Geostatistics) Stanford University, California, June 1992
- Master of Science, Applied Earth Sciences (Geostatistics) Stanford University, California, April 1987
- Bachelor of Science, Mining Engineering (With Distinction) University of Alberta, April 1985

Employment History:

- *1997 - present:* Department of Civil & Environmental Engineering, University of Alberta, Edmonton, Canada
Professor (Associate Professor prior to July 2001): teach and direct research within the School of Mining and Petroleum Engineering within the Department. Active areas of research include (1) the application of geostatistical tools to modeling petroleum reservoirs, (2) stochastic methods for grade control, and (3) improved techniques for geostatistical modeling that integrate diverse data types such as complex non-linear geologic features and dynamic historical production data. Consultant: within university guidelines, provide consulting assistance to companies and government institutions in the area of geostatistical modeling.
- *September 1995 - 1997:* Department of Petroleum Engineering, Stanford University
Associate Professor (Research): direct research within the Stanford Center for Reservoir Forecasting (an industrial consortium); teach classes in reservoir modeling and interdisciplinary aspects of reservoir management. Active areas of research include (1) hierarchical pseudo-genetic simulation of reservoir lithofacies, (2) prior integration of seismic and production data in stochastic reservoir models, and (3) dynamic scale-up from geologic model to flow model. Consultant: within university guidelines, provide consulting assistance to companies and government institutions in the area of geostatistical modeling.

- *June 1992 - August 1995*: Exxon Production Research Company, Houston, Texas
 Research Specialist: assigned to the Geologic/Engineering Studies Section of the Reservoir Division to conduct research and applications projects in reservoir characterization. 60% of time devoted to basic research into improved geostatistical techniques for lithofacies and petrophysical property modeling. Remaining time devoted to applications/testing of these methods to practical problems (e.g., North Sea, Texas, Canada, Saudi Arabia, China, and Australia) and teaching in-house training schools. Consulting Associate Professor: gave lectures, led seminars, and advised students in the area of reservoir characterization.
- *July 1987 - December 1989*: Placer Dome Inc., Vancouver, BC
 Geostatistician/Mining Engineer: duties included the preparation of geostatistical geological models, mineral inventories, and mine designs for project evaluations and feasibility studies. In addition, research was directed towards the development of new ideas and techniques related to the use of geostatistics and computers in mine engineering. Prepared feasibility studies and reports on the geostatistical characterization of a number of mineral properties.

Summary of Publications



- Deutsch, C.V. and Journel, A.G., *GSLIB: Geostatistical Software Library and Users Guide*, Oxford University Press, New York, first edition, 1992, 335 pages.
- Deutsch, C.V. and Journel, A.G., *GSLIB: Geostatistical Software Library and Users Guide*, Oxford University Press, New York, second edition, 1997, 369 pages.
- Deutsch, C.V., *Geostatistical Reservoir Modeling*, Oxford University Press, New York, 2002, 376 pages.
- Leuangthong, O. and Deutsch, C.V., *Geostatistics Banff 2004*, Springer, New York, 2006, ISBN 1402035152, 548 pages.
- Wen, X.H., Deutsch, C.V., Cullick, A.S., and Reza, Z.A., *Integration of Production Data in Generating Reservoir Models*, Centre for Computational Geostatistics, Edmonton, Alberta, 2005, ISBN 0-9738460-0-3, 205 pages.
- Leuangthong, O., Khan, D., and Deutsch, C.V., *Solved Problems in Geostatistics*, Wiley Interscience, New York, 2008, 208 pages.
- Rossi, M.E., and Deutsch, C.V., *Mineral Resource Estimation*, Springer Verlag, New York, 2014, 332 pages.
- Pyrcz, M.J., and Deutsch, C.V., *Geostatistical Reservoir Modeling*, Oxford University Press, New York, second edition, 2014, 433 pages.

A list of peer-reviewed and conference papers is available on Dr. Deutsch's website (see above). Dr. Deutsch has also published a number of chapters in books and special proceedings.

Research Grants

Dr. Deutsch receives significant research grant funding. He has held an annual NSERC grant since beginning to teach at the University of Alberta in 1997. He also receives a Discovery Accelerator Supplement from NSERC. He receives some funding through his Canada Research Chair and his Alberta Chamber of Resources Industry Chair. Most of his operating research funds come through the Centre for Computational Geostatistics (CCG) launched in 1997. There are currently 40 member companies.

Graduate Students

Dr. Deutsch has graduated 28 Ph.D. students and 29 M.Sc. students. He has co supervised many more. He consistently supervises more than 15 research based graduate students at a time.

Educational Activities

- Dr. Deutsch teaches two undergraduate courses per school year (each consisting of 3 lecture hours and 3 laboratory hours per week), two graduate courses per school year (each consisting of 3 lecture hours), some service teaching (project supervision, field trips, and survey school), the Citation Program in Applied Geostatistics and numerous short courses.
- Developed and routinely teach *Geostatistics* to third year undergraduate students. The course reader, laboratories, and assignments ensure students master conventional and geostatistical methods for construction of geological models.
- Developed and routinely teach *Theoretical Geostatistics* to graduate students. The course presents geostatistical methods for characterizing the spatial distribution of regionalized variables such as ore grades, porosity, permeability, and contaminant concentrations. This class focuses on quantifying spatial variability, estimation, and simulation with Gaussian, indicator, and other methods.
- Teaching intensive short courses to industry is an important part of Dr. Deutsch's professional activity. He has taught more than 175 international short courses (see website address above for recent list). Most short courses are four days long and present the fundamentals of geostatistics.

Professional Activities

- Member of the Society of Petroleum Engineers (SPE). Dr. Deutsch also serves the SPE as a Technical Editor in the area of Reservoir Characterization and Reservoir Engineering.
- Member of the Society for Mining, Metallurgy, and Exploration Inc. (SME) and the Canadian Institute of Mining, Metallurgy and Petroleum (CIM).
- Registered Professional Engineer in the province of Alberta, Canada.
- Member of the International Association for Mathematical Geology (IAMG) and Associate Editor of Mathematical Geosciences. Dr. Deutsch has served on the Executive of the IAMG as Secretary General.

Awards

Dr. Deutsch has received numerous international awards in addition to a number of professor and technical editor award. Some notable awards include the 2017 IAMG Distinguished Lecturer, 2014 John Cedric Griffiths Teaching Award (International Association of Mathematical Geosciences award presented to honor outstanding teaching), appointment as the Alberta Chamber of Resources Industry Chair in Mining Engineering (10/2003), an appointment as a Tier 1 Canada Research Chair in Natural Resources Uncertainty Characterization (7/2003), awarded the 2002 best paper from The Society of Professional Well Log Analysts (SPWLA) for paper in *Petrophysics*, awarded a 2002-2003 Killam Annual Professor, and awarded the 2001 Martha Cook Piper Research Prize.

Consulting

Dr. Deutsch consults internationally on geostatistical characterization of heterogeneity and management of uncertainty. The primary activities are leading and performing technical studies and developing software.