

Course Title	Course Code	Duration (Days)	Date	Instructor	Course Description
Applied Petroleum Geomechanics - Fundamental	GNU-01	5	Code 1 & Code 5	Ken Russell	<p>This course is intended as an introduction to geomechanics for Geologists, Geophysicists, Drilling Engineers, Well Engineers, Production Technologists, Completion Engineers, Well Superintendents, Directional Drillers, Wellsite Supervisors and others, who wish to further their understanding of rock mechanics and its application to drilling and completion. There is no specific formal pre-requisite for this course. However, attendees are requested to have a basic awareness of drilling and well planning and should hold a geoscience or engineering qualification.</p> <p>The course introduces the necessary fundamentals of petroleum geomechanics; it discusses how in-situ earth stresses, pore pressure and rock properties can be determined from routinely acquired formation evaluation and core test data. Attendees will learn how to use this data to construct a rock mechanical earth model which will then be used to make predictions of wellbore instability, sand production and fracture geometry for well construction and stimulation operations. The course emphasis will be on integrating the topics presented and illustrating how the basic principles are applied to everyday drilling and production challenges. The course is essentially non-mathematical and makes wide use of diagrams, pictures and exercises to illustrate the essentials of geomechanics.</p>
Applied Petroleum Geomechanics - Intermediate	GNU-02	5	Code 3	Ken Russell	<p>This course is intended for Geologists, Geophysicists, Geomechanics Engineers, Drilling Engineers, Well Engineers, Production Technologists, Completion Engineers, Well Superintendents, Directional Drillers, Wellsite Supervisors and others, who wish to gain an intermediate level of understanding of rock mechanics and its application to drilling and completion. Attendees are requested to have completed a Foundation Course in geomechanics, to have been exposed to drilling, completions and production operations in their positions and to have a recommended minimum of 3 years of field experience.</p> <p>The course starts by reviewing the necessary fundamentals of petroleum geomechanics and discussing how to use drilling, log and rock mechanical test data</p>

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					<p>to construct a rock mechanical earth model for the prediction of rock deformation and failure during drilling. The course discusses how pressure depletion affects reservoir stresses and how compaction and subsidence, fault reactivation and damage to completion may result. Log and core data are used to define the significance of anisotropic behavior of rocks when considering mechanical properties and stress. The course finishes with an explanation of how to identify lost circulation mechanisms and the actions to mitigate against them. The course is essentially non-mathematical and the emphasis will be on integrating the topics presented and illustrating how the basic principles are applied to resolve everyday drilling and production challenges</p>
<p>Applied Petroleum Geomechanics - Advanced</p>	<p>GNU-03</p>	<p>5</p>	<p>Code 4</p>	<p>Ken Russell</p>	<p>This course is intended for Geophysicists, Geologists, Geomechanics Engineers, Drilling Engineers, Well Engineers, Production Technologists, Completion Engineers, Exploration Managers and others, concerned with the geomechanics challenges of unconventional field development. Participants are requested to have a broad knowledge of fundamental geomechanics or have attended geomechanics training at an intermediate level. They should also have been exposed to drilling, completions and production operations in their positions and to have a recommended minimum of 5 years of field experience.</p> <p>The course starts by reviewing the necessary fundamentals of petroleum geomechanics and the construction of rock mechanical earth models for the prediction of rock deformation and failure of ideal, homogeneous, isotropic and intact rock. The course delivers the necessary theoretical background to model the behaviour of real rock that is anisotropic, layered and fractured, leading to optimal hydraulic fracture placement. The formulation of the inelastic behaviour of near wellbore rock illuminates bit design and wellbore strengthening techniques. The course ends with a discussion of the effect of salt movement on drilling and completion programs and the prediction of earthquakes and the movement along faults and fractures. The course aims to present these advanced geomechanical topics in a simplified format that does not require advanced mathematical agility. The emphasis will be on illustrating how</p>

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					these advanced techniques are applied to resolve everyday drilling and production challenges.
Geomechanics for Drillers – Fundamental (depending on level of experience)	GNU-04	3-5	Code 2 & Code 6	Ken Russell	<p>This course is intended as an introduction to the basic principles of geomechanics applied to the drilling process and is intended for Drillers, Drilling Engineers, Geologists, Geophysicists, Well Engineers, Production Technologists, Completion Engineers, Well Superintendents, Directional Drillers, Wellsite Supervisors and others, who require a basic understanding of rock mechanics and its application to drilling and completion. There is no specific formal pre-requisite for this course. However, attendees are requested to have a basic awareness of drilling and well planning and should hold a geoscience or engineering qualification.</p> <p>The course introduces the necessary fundamentals of petroleum geomechanics; it discusses how in-situ earth stresses, pore pressure and rock properties can be determined from routinely acquired drilling, formation evaluation and core test data. Attendees will learn how to use this data to construct a rock mechanical earth model which will then be used to make predictions of wellbore instability. The course discusses how pore pressure is generated in the subsurface and the origin and estimation of over-pressure. It also discusses the rationale behind estimates of drillers frac gradient and in-situ earth stresses, highlighting the appropriate acquisition of leak-off test and other log and drilling data to manage wellbore instability. Course examples illustrate how to build a drilling plan that raises awareness of drilling hazards and maintains wellbore stability. The learning process will be focussed on integrating the topics presented and illustrating how the basic principles are applied to everyday drilling and production challenges. The course is essentially non-mathematical and makes wide use of diagrams, pictures and exercises to illustrate the essentials of geomechanics.</p>

Curriculum Vitae - Ken Russell

3rd May 2016



Ken Russell is an operational geomechanics advisor with over 40 years of experience in exploration, development and production in the upstream oil and gas industry. He is the Director and Geomechanics Advisor for Russell Geomechanics Limited in Aberdeen, Scotland, where he provides geomechanics consultancy services including tutoring, mentoring and instruction to the worldwide oil and gas industry. After obtaining a BSc (Hons) Physics degree from Aberdeen University, Ken worked for a variety of oil service companies in wireline operations, management and formation evaluation, before joining Schlumberger in 1995. Since 2000 he has worked principally in real-time geomechanics operations and developing acousto-geomechanical applications, taking on the role of geomechanics advisor and technical manager within the Europe-Africa area of operations. Before forming his own company in 2014, Ken was one of Schlumberger's principal instructors, delivering cross-discipline internal and external geomechanics training to petrophysicists, geologists,

reservoir, petroleum, well construction and drilling engineers at operating company locations, training centers and operational centers worldwide. Through extensive operational and wellsite experience gained in the North Sea, Europe, Africa, South America and the Far East, he has gained a broad based knowledge of drilling, production, log data acquisition, analysis and interpretation that has allowed him to develop and deliver pragmatic solutions to the geomechanical challenges of drilling, sand production, reservoir stimulation and unconventional reservoirs, faced by operators.

His principal interests include the development and application of acousto-geomechanical techniques for the evaluation of anisotropic formations and fracture systems and the identification and prevention of wellbore instability.

Recent Geomechanics Consultancy and Instruction

- March 2016 – Malaysia - *Intermediate Geomechanics* - Public training course for PetroEdge Asia
- November 2015 – France – *Geomechanics for Drillers* – In-house training for Schlumberger
- October 2015 – France – *Geomechanics for Drillers* – In-house training for Schlumberger
- June 2015 – Venezuela – *Advanced Geomechanics* – In-house training for Petroleos de Venezuela SA organised by Schlumberger NExT
- May 2015 – Kazakhstan - *Advanced Geomechanics* – Public training course for Schlumberger NExT

- March 2015 – Malaysia – *Intermediate Geomechanics* - Public training course for PetroEdge Asia
- March 2015 – France – *Basic Petrophysics and Geomechanics for Drillers* – In-house training for Schlumberger
- January 2015 – France – *Geomechanics for Drillers* – In-house training for Schlumberger
- December 2014 – France – *Geomechanical Aspects of Lost Circulation* – In-house training for Schlumberger
- November 2014 – France – *Geomechanics for Drillers* – In-house training for Schlumberger
- November 2015 – Mexico – *Introduction to Geomechanics* – In-house course for Pemex organised by Schlumberger NExT
- October 2014 – France – *Geomechanics for Drillers* – In-house training for Schlumberger
- October 2014 – France – *Introduction to Geomechanics* – In-house training for Total organised by Schlumberger NExT
- September 2014 – France – *Basic Petrophysics and Geomechanics for Production Engineers* – In-house training for Schlumberger
- June 2014 - France - *Geomechanics for Drillers* – In-house training for Schlumberger
- June 2014 - Russia - *Geomechanics for Drillers* – In-house training for SEIC Sakhalin organised by Schlumberger NExT and consultancy on wellbore and reservoir stability for development of the Lunskeye Field
- June 2014 – France – *Geomechanical Aspects of Lost Circulation* – In-house training for Schlumberger
- May 2014 – France – *Geomechanics for Production Engineers* – In-house training for Schlumberger
- May 2014 - USA - *Geomechanics for Drillers* – In-house training for Schlumberger
- April 2014 – Russia – Advising on wellbore stability for Bashneft appraisal and development drilling in the Bazhenov shale oil

Summary

- Hons. B.Sc. Physics – Aberdeen University, Scotland, 1975
- Scientific Advisor and dedicated rock mechanics instructor for Schlumberger internal courses since 2000. Delivering geomechanics consultancy and training as Director and Geomechanics Advisor for Russell Geomechanics Ltd. since 2014.
- Publications:
 - o Russell., K.A. et al, *Predicting and Preventing Wellbore Instability: Tullich Field Development, North Sea*, Paper SPE 84269 presented at SPE ATCE, Denver, Colorado, USA 8-8 October, 2003
 - o Russell, K.A., et al, *Improved Drilling Performance in a Troublesome Environment*, Paper SPE 90373, presented at SPE ATCE, Houston, Texas, USA, 26-29 September 2004
- Membership of Professional Institutions:
 - o The Society of Petroleum Engineers (SPE) since 1984
 - o The Society of Petrophysicists and Well Log Analysts (SPWLA) since 1982
 - o The Petroleum Exploration Society of Great Britain (PESGB) since 1996
- Oil & Gas Industry experience: 40 years