Petroleum Engineering 635
Underbalanced and Managed Pressure Drilling
Syllabus
Fall 2009

Instructor: Jerome Schubert
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Office: Room 501K, Richardson Building

Description of Course: (Concise Statement of purpose of design) This course provides an introduction and application of techniques utilized in underbalanced and managed pressure drilling. Topics covered are equipment, types of drilling fluids used (air, mist foam, etc.), flow drilling, mud cap drilling and hydraulics calculations.

Text Materials:
- “Gas Volume Requirements for Underbalanced Drilling”, Guo, Boyun and Ghalambor, Ali, PennWell Corporation, Tulsa, OK, 2002

References:
- “Mudlite Air/Mist/Foam Hydraulics Model”, Maurer Engineering Inc., Houston, 1988

Course Outline: (by major topics, and approximate time for each topic)

<table>
<thead>
<tr>
<th>Topic</th>
<th>Description</th>
<th>Time</th>
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<tbody>
<tr>
<td>3</td>
<td><em>Selecting an Appropriate Candidate and Technique</em>: Geophysical and Geological Aspects, Reservoir Characteristics, and Feasibility. Wellbore construction constraints, and fluid selection. Economics</td>
<td>3 hrs</td>
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<td>4</td>
<td><em>Well Engineering</em>: Circulation programs and calculations. Wellhead, casing, and completion design. Bit selection, Underbalanced perforating, and drillstring design</td>
<td>6 hrs</td>
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<td>5</td>
<td><em>Special Considerations</em>: Safety, regulatory requirements, and environmental issues. Directional, percussion, and high pressure drilling. Cementing, formation evaluation</td>
<td>4 hrs</td>
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<td>6</td>
<td><em>Blowout Preventer Equipment</em>: Primary control, rotating heads, diverters, and RBOPs. UBD well control procedures. Sour wells and other special well control considerations</td>
<td>6 hrs</td>
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<tr>
<td>7</td>
<td><em>Risk Management for Underbalanced Operations</em>: Risk identification, analysis, and mitigation</td>
<td>4 hrs</td>
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<tr>
<td>8</td>
<td><em>Downhole Problems and Troubleshooting</em>: Wellbore instability, vibration, fluid influxes, stuck pipe and fishing, corrosion.</td>
<td>3 hrs</td>
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<td>9</td>
<td><em>Introduction to Managed Pressure Drilling</em>: What is MPD? Why MPD? Techniques</td>
<td>3 hrs</td>
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<td>10</td>
<td><em>Dual Gradient Drilling</em></td>
<td>2 hrs</td>
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<td>11</td>
<td><em>Microflux Drilling</em></td>
<td>1 hr</td>
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<tr>
<td>9</td>
<td>Well Control, drilling problems, safety and environmental issues</td>
<td>4 hrs</td>
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Subtotal: 43 hrs

In-class Exams: 2 hrs

Total: 45 hrs
Course grading:
Midterm Exam.......................................................... (25%)
Final Exam............................................................... (25%)
Homeworks............................................................. (25%)
Project................................................................. (25%)

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