Project No # 01

<table>
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<tr>
<th>Project Level:</th>
<th>UG/PG</th>
<th>Individual</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Title:</td>
<td>Computational Fluid Dynamics visualization and optimization of the ball kill process of blowout wells</td>
<td></td>
</tr>
<tr>
<td>Supervisor(s):</td>
<td>Xianhua Liu</td>
<td></td>
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<tr>
<td>Level of supervision expected</td>
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</table>

Project outline and scope:
Offshore well blowout can cause big disasters. A rapid kill and restoration system for blowout wells has been invented. It uses heavy kill balls to solve the problem and had won the AGT 2012 innovation award. This research project carries out Computational Fluid Dynamics simulation of the ball kill process for blowout wells to further develop this technology.

Expected Tasks:
- Literature survey on well blowout problems and available kill methods. Compare advantages and disadvantages of these methods
- CFD simulation of the ball kill process and analyse the simulation results for optimized kill operation
- Write up reports, thesis and presentations

Expected outcome:
- This project obtain a visualized and optimized ball kill process for blowout wells

Facilities required (if any):
- Uses CFD software such as ANSYS Fluent or CFX

References (if any):

Name of the student
Project No #02

<table>
<thead>
<tr>
<th>Project Level:</th>
<th>UG/PG</th>
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</thead>
</table>

<table>
<thead>
<tr>
<th>Project Title:</th>
<th>Computational Fluid Dynamics visualization and optimization of the restoration process of killed blowout wells by solid balls</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor(s):</td>
<td>Xianhua Liu</td>
</tr>
<tr>
<td>Level of supervision expected</td>
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</table>

**Project outline and scope:**
Offshore well blowout can cause big disasters. A rapid kill and restoration system for blowout wells has been invented. It uses heavy kill balls to solve the problem and had won the AGT 2012 innovation award. This research project carries out Computational Fluid Dynamics simulation of the restoration process for blowout wells by taking out of the kill ball with increased well flow to further develop this technology.

**Expected Tasks:**
- Literature survey on well blowout problems and available kill methods. Compare advantages and disadvantages of these methods
- CFD simulation of the well restoration process by taking out kill balls with increased well flow and analyse the simulation results for optimized restoration operation
- Write up reports, thesis and presentations

**Expected outcome:**
- This project obtains visualized and optimized well restoration process

**Facilities required (if any):**
- Uses CFD software such as ANSYS Fluent or CFX

**References (if any):**

**Name of the student**
Project No # 03

<table>
<thead>
<tr>
<th>Project Level:</th>
<th>UG/PG</th>
<th>A Group of two students</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project Title:</td>
<td>Design and analysis of a rapid kill and restoration system for blowout wells</td>
<td></td>
</tr>
<tr>
<td>Supervisor(s):</td>
<td>Xianhua Liu</td>
<td></td>
</tr>
<tr>
<td>Level of supervision expected</td>
<td></td>
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</tr>
</tbody>
</table>

**Project outline and scope:**
Offshore well blowout can cause big disasters. A rapid kill and restoration system for blowout wells has been invented. It uses heavy kill balls to solve the problem and had won the AGT 2012 innovation award. This research project carries out mechanical design and calculation of the system based on the prototype design to further develop this technology.

**Expected Tasks:**
- Literature survey on well blowout problems and available kill methods. Compare advantages and disadvantages of these methods.
- Find suitable software and carry out mechanical design and calculation of the rapid kill and restoration system for further detailed development of the system.
- The two students will work closely to support each other but will divide the task into two parts and each student is mainly responsible for one part.
- Write up reports, thesis and presentations.

**Expected outcome:**
- This project provides a more detailed design of the rapid kill and restoration system.
- This project can have some 3D modelling and animation works outcome at the student’s choice.

**Facilities required (if any):**
- Use any mechanical design and analysis software available at Curtin, such as ANSYS, AutoCAD and Solidworks, Autodesk.

**References (if any):**

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 04

<table>
<thead>
<tr>
<th>Project Level:</th>
<th>UG</th>
<th>Individual</th>
</tr>
</thead>
</table>

| Project Title: | Reservoir rock characterisation using micro-computed tomography and pore network extraction |
| Supervisor(s): | Stefan Iglauer, Mohammad Sarmadivaleh |
| Level of supervision expected | |

Project outline and scope:
You will process 3D rock images acquired with a micro-computed tomograph, and from the processed images you will extract and analyse pore networks. The images will be provided.

You need good knowledge of mathematics and petrophysics for this project.

Expected Tasks:
- Process micro-tomography images
- Extract networks
- Analyze your results in the context of scientific literature.

Expected outcome:
- Processed micro-tomography images
- Extracted networks

Facilities required (if any)
Avizo software access will be provided.

References (if any):


8. CH Pentland, S Iglauer, O Gharbi, K Okada, T Suekane, “The influence of pore space geometry on the entrapment of carbon dioxide by capillary forces”, SPE 158516, SPE Asia Pacific Oil and Gas Conference and Exhibition, Perth, Australia, 22-24th October 2012

Project No # 05
Project Level: PG Individual

| Project Title: | Reservoir rock characterisation using micro-computed tomography and pore network extraction |
| Supervisor(s): | Stefan Iglauer, Mohammad Sarmadivaleh |
| Level of supervision expected | |

Project outline and scope:
You will process 3D rock images acquired with a micro-computed tomograph, and from the processed images you will extract and analyse pore networks. The images will be provided.

You need good knowledge of mathematics and petrophysics for this project.

Expected Tasks:
- Process micro-tomography images
- Extract networks
- Analyze your results in the context of scientific literature.

Expected outcome:
- Processed micro-tomography images
- Extracted networks

Facilities required (if any)
Avizo software access will be provided.

References (if any):


For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au


8. CH Pentland, S Iglauer, O Gharbi, K Okada, T Suekane, “The influence of pore space geometry on the entrapment of carbon dioxide by capillary forces”, SPE 158516, SPE Asia Pacific Oil and Gas Conference and Exhibition, Perth, Australia, 22-24th October 2012


Name of the student
Project No # 06

Project Title: Subsurface Processes: Analysis based on micro-tomography imaging

Supervisor(s): Stefan Iglauer, Mohammad Sarmadivaleh

Project outline and scope:
Here we study two-phase flow processes at the micrometre pore-scale in 3D, which are relevant at the field scale. We imaged such processes with a micro-tomograph, and you will analyse the image and quantify the process parameters.

You need good knowledge of mathematics and petrophysics for this project.

Expected Tasks:
- Process micro-tomography images (image will be provided)
- Quantify all relevant process parameters
- Analyze your results in the context of scientific literature.

Expected outcome:
- Processed micro-tomography images
- Quantification and analysis of all relevant process parameters

Facilities required (if any)
Avizo software access will be provided.

References (if any):


5. S Iglauer, S Favretto, G Spinosa, G Schena, MJ Blunt, “X-ray tomography measurements of
power-law cluster size distributions in sandstones”, *Physical Review E*, 82, 5, 056315, 2010


8. CH Pentland, S Iglauer, O Gharbi, K Okada, T Suekane, “The influence of pore space geometry on the entrapment of carbon dioxide by capillary forces”, SPE 158516, SPE Asia Pacific Oil and Gas Conference and Exhibition, Perth, Australia, 22-24th October 2012


<table>
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<th>Name of the student</th>
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</table>
Project No # 07

| Project Level: | PG | Individual |

| Project Title: | Subsurface Processes: Analysis based on micro-tomography imaging |
| Supervisor(s): | Stefan Iglauer, Mohammad Sarmadivaleh |
| Level of supervision expected | |

**Project outline and scope:**
Here we study two-phase flow processes at the micrometre pore-scale in 3D, which are relevant at the field scale. We imaged such processes with a micro-tomograph, and you will analyse the image and quantify the process parameters.

You need good knowledge of mathematics and petrophysics for this project.

**Expected Tasks:**
- Process micro-tomography images (image will be provided)
- Quantify all relevant process parameters
- Analyze your results in the context of scientific literature.

**Expected outcome:**
- Processed micro-tomography images
- Quantification and analysis of all relevant process parameters

**Facilities required (if any):**
Avizo software access will be provided.

**References (if any):**


For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au


8. CH Pentland, S Iglauer, O Gharbi, K Okada, T Suekane, “The influence of pore space geometry on the entrapment of carbon dioxide by capillary forces”, SPE 158516, SPE Asia Pacific Oil and Gas Conference and Exhibition, Perth, Australia, 22-24th October 2012


Name of the student

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 08

<table>
<thead>
<tr>
<th>Project Level:</th>
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<th>Individual</th>
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</table>

| Project Title: | Generation of high resolution mathematical meshes of rocks |
| Supervisor(s): | Stefan Iglauer, Mohammad Sarmadivaleh, Shakil Ahmed |
| Level of supervision expected | |

Project outline and scope:
You will generate mathematical meshes from binary or ternary micro tomography images for a number of different rocks. These meshes can be used as input files for Computational Fluid Dynamics codes.

You need good knowledge of mathematics and petrophysics for this project.

Expected Tasks:
- Generate mathematical meshes from binary micro-tomography images (images will be provided)
- Build a mesh library

Expected outcome:
- Several mathematical meshes of different rocks

Facilities required (if any)
Meshing software will be provided.

References (if any):
5. S Iglauer, S Favretto, G Spinosa, G Schena, MJ Blunt, “X-ray tomography measurements of...
power-law cluster size distributions in sandstones”, Physical Review E, 82, 5, 056315, 2010


8. CH Pentland, S Iglauer, O Gharbi, K Okada, T Suekane, “The influence of pore space geometry on the entrapment of carbon dioxide by capillary forces”, SPE 158516, SPE Asia Pacific Oil and Gas Conference and Exhibition, Perth, Australia, 22-24th October 2012

Project No # 09

Project Level: UG Individual

<table>
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<th>Project Title:</th>
<th>Generation of high resolution mathematical meshes of rocks</th>
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<tbody>
<tr>
<td>Supervisor(s):</td>
<td>Stefan Iglauer, Mohammad Sarmadivaleh, Shakil Ahmed</td>
</tr>
<tr>
<td>Level of supervision</td>
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</table>

Project outline and scope:
You will generate mathematical meshes from binary or ternary micro tomography images for a number of different rocks. These meshes can be used as input files for Computational Fluid Dynamics codes.

You need good knowledge of mathematics and petrophysics for this project.

Expected Tasks:
- Generate mathematical meshes from binary micro-tomography images (images will be provided)
- Build a mesh library

Expected outcome:
- Several mathematical meshes of different rocks

Facilities required (if any)
Meshing software will be provided.

References (if any):


For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au


8. CH Pentland, S Iglauer, O Gharbi, K Okada, T Suekane, “The influence of pore space geometry on the entrapment of carbon dioxide by capillary forces”, SPE 158516, SPE Asia Pacific Oil and Gas Conference and Exhibition, Perth, Australia, 22-24th October 2012


For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 10

<table>
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<tr>
<th>Project Level:</th>
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<table>
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<tr>
<th>Project Title:</th>
<th>Permeability calculations using Computational Fluid Dynamics codes and micro-computed tomography images</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor(s):</td>
<td>Stefan Iglauer, Mohammad Sarmadivaleh</td>
</tr>
<tr>
<td>Level of supervision expected</td>
<td></td>
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</table>

Project outline and scope:
You will compute rock permeability with Computational Fluid Dynamics codes and mathematical rock meshes as input files.

You need good knowledge of mathematics and fluid dynamics for this project.

Expected Tasks:
- Compute single-phase brine permeability for a range of rocks

Expected outcome:
- Single-phase permeabilities computed for different rocks

Facilities required (if any)
ANSYS software will be provided.

References (if any):


tomography image resolution on the predictions of petrophysical properties", International Petroleum Technology Conference, Beijing, China, 26-28th March, 2013


8. CH Pentland, S Iglauer, O Gharbi, K Okada, T Suekane, “The influence of pore space geometry on the entrapment of carbon dioxide by capillary forces”, SPE 158516, SPE Asia Pacific Oil and Gas Conference and Exhibition, Perth, Australia, 22-24th October 2012


<table>
<thead>
<tr>
<th>Name of the student</th>
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Project No # 11

Project Title: Permeability calculations using Computational Fluid Dynamics codes and micro-computed tomography images

Supervisor(s): Stefan Iglauer, Mohammad Sarmadivaleh

Project outline and scope:
You will compute rock permeability with Computational Fluid Dynamics codes and mathematical rock meshes as input files.

You need good knowledge of mathematics and fluid dynamics for this project.

Expected Tasks:
- Compute single-phase brine permeability for a range of rocks

Expected outcome:
- Single-phase permeabilities computed for different rocks

Facilities required (if any)
ANSYS software will be provided.

References (if any):

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au


8. CH Pentland, S Iglaeur, O Gharbi, K Okada, T Suekane, “The influence of pore space geometry on the entrapment of carbon dioxide by capillary forces”, SPE 158516, SPE Asia Pacific Oil and Gas Conference and Exhibition, Perth, Australia, 22-24th October 2012


| Name of the student |  |
Project No # 12

<table>
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<tr>
<th>Project Level:</th>
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| Project Title: | Risk assessment for carbon geo-sequestration projects |
| Supervisor(s): | Stefan Iglauer, Mohammad Sarmadivaleh |
| Level of supervision expected | |

Project outline and scope:
You will produce a risk assessment for carbon geo-sequestration (CGS) projects with specified petrophysical parameters as input variables. You will assess how variation of these petrophysical variables impacts on the risk associated with such projects. You will also suggest a failure criterion for CGS schemes.

You need good knowledge of reservoir engineering, petrophysics and fluid dynamics for this project. A background in the risk assessment field would be beneficial.

Expected Tasks:
- Produce a risk assessment for carbon geo-storage projects with specified petrophysical parameters as variables

Expected outcome:
- A risk assessment for carbon geo-storage projects with specified petrophysical parameters as variables
- Assessment of influence of variation in petrophysical parameters on project risk
- Suggestion of a failure criterion

Facilities required (if any)

References (if any):

Name of the student

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 13

<table>
<thead>
<tr>
<th>Project Level:</th>
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<th>Individual</th>
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</table>

| Project Title: | Risk assessment for carbon geo-sequestration projects |
| Supervisor(s): | Stefan Iglauer, Mohammad Sarmadivaleh |
| Level of supervision expected | |

**Project outline and scope:**

You will produce a risk assessment for carbon geo-sequestration (CGS) projects with specified petrophysical parameters as input variables. You will assess how variation of these petrophysical variables impacts on the risk associated with such projects. You will also suggest a failure criterion for CGS schemes.

You need good knowledge of reservoir engineering, petrophysics and fluid dynamics for this project. A background in the risk assessment field would be beneficial.

**Expected Tasks:**
- Produce a risk assessment for carbon geo-storage projects with specified petrophysical parameters as variables

**Expected outcome:**
- A risk assessment for carbon geo-storage projects with specified petrophysical parameters as variables
- Assessment of influence of variation in petrophysical parameters on project risk
- Suggestion of a failure criterion

**Facilities required (if any)**

**References (if any):**

**Name of the student**: 

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 14

Project Level: UG

Project Title: The effect of well orientation (Vertical vs Horizontal) on CO2 Sequestration in a deep saline aquifer in Western Australia

Supervisor(s): Stefan Iglauer, Hassan Bahrami

Level of supervision expected

Project outline and scope:
You will analyse the effect of well orientation on CO2 geo-sequestration efficiency. You will use field scale reservoir simulators, which will be provided.

You need good knowledge of reservoir engineering and reservoir simulators for this project.

Expected Tasks:
- Analyse the effect of well orientation on CO2 geo-sequestration efficiency.

Expected outcome:
- Analysis of the effect of well orientation on CO2 geo-sequestration efficiency

Facilities required (if any)
Reservoir simulation software will be provided

References (if any):


For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au


El-Maghraby and Blunt 2012, Environmental Science and Technology


Pentland et al. 2011, Geophysical Research Letter

Pentland et al. 2012, SPE Asia Pacific conference


Saeedi et al. 2012


Name of the student

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain  
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au


El-Maghraby and Blunt 2012, Environmental Science and Technology


Pentland et al. 2011, Geophysical Research Letter

Pentland et al. 2012, SPE Asia Pacific conference


Saeedi et al. 2012


Name of the student
Project No # 16

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<th>Project Level</th>
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<th>Group/Individual.</th>
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<tr>
<td>Project Title</td>
<td>The effect of particle size on gas adsorption</td>
<td></td>
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<tr>
<td>Supervisor(s)</td>
<td>A/Professor Reza Rezaee, Mehdi Labani</td>
<td></td>
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<tr>
<td>Level of supervision expected</td>
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</table>

**Project outline and scope:**
As no particle size standard exists for samples to be analysed for sorption analysis, an experiment should be conducted to assess the effect of various particle size distributions on methane adsorption on the coal samples.

**Expected Tasks:**
- Doing literature review
- Experimental studies

**Expected outcome:**
Providing an insight into the effect of particle size on adsorption and recommendation for the proper size in this analysis

**Facilities required (if any):**

**References (if any):**

**Name of the student:**

---

*For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain  
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au*
### Project No # 17

<table>
<thead>
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<th>Individual.</th>
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<tbody>
<tr>
<td><strong>Project Title:</strong></td>
<td>Design and construction of laboratory permeability apparatus for measuring gas shale rocks</td>
<td></td>
</tr>
<tr>
<td><strong>Supervisor(s):</strong></td>
<td>A/Prof. Reza Rezaee, Adnan Al Hinai</td>
<td></td>
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<tr>
<td><strong>Level of supervision expected</strong></td>
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### Project outline and scope:
Transport properties of shale gas are directly related to the porosity however complexity arises because the potential to flow depends critically on the geometry of the pore space such as pore throat size, connectivity, tortuosity and shape. Visualization and reconstruction of 3-dimensional pore networks are necessary to understand pore characteristics to shale physical behaviour and to predict flow properties.

### Expected Tasks:
- Use imaging software (AvizoFire) to stack the images (software available)
- Quantify the geometrical properties from software
- Estimate porosity and permeability from software
- Use Matlab to construct the 3D pore network model (codes available)
- Write a complete report on the project

### Expected outcome:
- Understand geometry and structural through image analysis
- How FIB/SEM images can be used to predict permeability

### Facilities required (if any)

### References (if any):
Project No # 18

**Project Level:** PG Individual.

**Project Title:** Design and assemblage of laboratory apparatus for measuring shale permeability

**Supervisor(s):** A/Prof. Reza Rezaee, Dr. Ali Saeedi, Adnan Al Hinai

**Level of supervision expected**

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**Project outline and scope:**
Determining permeability supports identifying the quality of a reservoir and essential to make a productive reservoir. Permeability is a parameter used to measure the ability of a rock to convey fluid through the porous medium. Shale reservoirs infer low porosity and ultra-low permeability in the range of 10 micro to 100 nanodarcy. The project consists of designing a suitable technique and construct the apparatus in the laboratory.

**Expected Tasks:**
- Literature review of the available techniques to measure gas shale permeability
- Provide a suitable schematic design (diagram & equipment required)
- Construct the instrument
- Measure permeability of some shale samples
- Write a report

**Expected outcome:**
- Measured laboratory permeability of gas shale

**Facilities required (if any)**

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**References (if any):**
- Lenormand, R., F. Baugot, and Gabriel Ringot. 2010. Permeability Measurement on Small Rock Samples International Symposium of the Society of Core Analysts, Halifax, Canada,
Project No # 19

<table>
<thead>
<tr>
<th>Project Level:</th>
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<th>Individual.</th>
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<tbody>
<tr>
<td>Project Title:</td>
<td>Comparison of World Crude Oil Types</td>
<td></td>
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<tr>
<td>Supervisor(s):</td>
<td>Ahmed Barifcani</td>
<td></td>
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<tr>
<td>Level of supervision expected</td>
<td>Full Supervision</td>
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</table>

Project outline and scope:
Various crude oil types are produced from different locations and countries which are refined to produce valuable hydrocarbon products. A technical and economical comparison is therefore required for the selected crude oil types from different locations. Crude oil evaluation is necessary for it to be used as a refinery feedstock to define the expected pre-treatment operations required to achieve the final products specifications.

Expected Tasks:
- Selection of 3-5 different types of world crude oils.
- Crude oil classifications.
- Crude oil evaluation methods and comparison of the selected crude oil types.
- Crude oil characteristics and physical properties comparison.
- Sulphur contents and the refinery treatments required.
- Product spectrum from each type of crude oil.

Expected outcome: A technical evaluation and comparison of the selected crude oils

Facilities required (if any),

References (if any):

Name of the student
For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au

| Project No # 20 |
|-----------------|-----------------|
| Project Title:  | Experimental investigation of the effect of hole inclination on cuttings transport |
| Supervisor(s):  | Vamegh Rasouli, Mohammadreza Kamyab |
| Level of supervision expected | |

**Project outline and scope:**
This is a lab based project to understand the behaviour of cuttings movement in different hole inclination. The flow loop unit developed and installed in the Department of Petroleum Eng labs will be used for this study.

**Expected Tasks:**
- Literature review of existing models and experimental studies
- Perform some experimental tests
- Prepare the final report

**Expected outcome:**
To understand cuttings transport behaviour by changing hole angle from the experimental results of the flow loop.

**Facilities required (if any)**
Flow loop

**References (if any):**

**Name of the student**
### Project No # 21

<table>
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<th>Project Level:</th>
<th>UG/PG</th>
<th>Individual</th>
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<tbody>
<tr>
<td><strong>Project Title:</strong></td>
<td>Experimental investigation of the effect of drilling mud on cuttings transport</td>
<td></td>
</tr>
<tr>
<td><strong>Supervisor(s):</strong></td>
<td>Vamegh Rasouli, Mohammadreza Kamyab</td>
<td></td>
</tr>
<tr>
<td><strong>Level of supervision expected</strong></td>
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</table>

### Project outline and scope:
This is a lab based project to understand the effect of drilling fluid on the behaviour of cuttings movement in the annulus space. The flow loop unit developed and installed in the Department of Petroleum Eng labs will be used for this study.

### Expected Tasks:
- Literature review to understand drilling mud rheological properties and existing studies
- Performing some experimental tests with different drilling fluids
- Prepare the final report

### Expected outcome:
To understand cuttings transport behaviour by changing drilling fluid from the experimental results of the flow loop

### Facilities required (if any)
Flow loop

### References (if any):

### Name of the student

---

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain  
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 22

Project Title: Numerical simulation of cuttings transport in drill pipe and annulus space

Supervisor(s): Vamegh Rasouli, Mohammadreza Kamyab

Level of supervision expected

Project outline and scope:
This is a desk based project to understand cuttings transport in pipe and annulus space. There are many parameters that affect the cuttings transport in the hole and this study will investigate the importance of some of these parameters in particles movement through the annulus space using numerical simulations. The results may be calibrated against lab experiments results of the flow loop which is carried out in parallel by others.

Expected Tasks:
- Literature review of numeral simulations of cuttings transport studies
- Performing some numerical simulation using Ansys Fluent
- Prepare the final report

Expected outcome:
Prepare models in Ansys Fluent and report the effect of controlling parameters on cuttings transport studies

Facilities required (if any)
ANSYS Software, available in Curtin

References (if any):

Name of the student

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
## Project No # 23

<table>
<thead>
<tr>
<th>Project Level:</th>
<th>UG/PG (any)</th>
<th>Group/Individual (any)</th>
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</thead>
</table>

| Project Title: | Experimental Investigation on the Effect of Fracturing Fluid Viscosity and Flow Rate on Hydraulic Fracturing Mechanism |
| Supervisor(s): | Vamegh Rasouli, Seyed Hassan Fallahzadeh |
| Level of supervision expected | |

## Project outline and scope:
Hydraulic fracturing is an effective reservoir stimulation method which is used mainly to increase the rate of hydrocarbon production. A sophisticated fluid is used to perform the hydraulic fracturing operation; the flow rate and viscosity of the fracturing fluid is critically important. To analyse these two important parameters, scaled hydraulic fracturing tests should be performed. In this project, cubic samples will be tested under true tri-axial stress condition, and in each test a specific fluid viscosity and flow rate will be applied. At the end, the results of the tests will be analysed and will be compared to real field data and/or numerical modelling results.

### Expected Tasks:
Surveying the literature, Preparing samples, performing various tests, analysing the results.

### Expected outcome:
The output of this study will be a series of recommended practice, which would be greatly useful for designing real field and laboratory hydraulic fracturing operations.

### Facilities required (if any): Sample preparation equipment, true tri-axial stress cell, fracturing fluids, pumps, which are all available in Geomechanics laboratory of Petroleum Eng Department.

## References (if any):

## Name of the student

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
**Project No # 24**

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<tr>
<th>Project Level</th>
<th>UG/PG (any)</th>
<th>Group/Individual (any)</th>
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<tbody>
<tr>
<td><strong>Project Title:</strong></td>
<td>Numerical Simulation of Hydraulic Fracturing from a Deviated Open Wellbore.</td>
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<tr>
<td><strong>Supervisor(s):</strong></td>
<td>Vamegh Rasouli, Seyed Hassan Fallahzadeh</td>
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<td><strong>Level of supervision expected</strong></td>
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**Project outline and scope:**
Hydraulic fracturing has been used over many years to stimulate hydrocarbon bearing formations. The process of fracture initiation and near wellbore propagation in deviated open wellbore has been always a challenge for fracturing such kind of wellbores. In this study, the mechanism of fracture creation in these kinds of wellbores will be simulated using Abaqus software, which is a strong tool for analysing various mechanical studies. The results of this numerical study could be later compared to the experimental results that are obtained from other research projects.

**Expected Tasks:**
- Doing literature review in hydraulic fracturing of deviated wellbore.
- Studying the basics of Abaqus software and getting familiar with numerical analysis.
- Building the required model and interpreting the results.
- Comparing the results with previous works and experimental and/or field data.

**Expected outcome:**
A numerical model will be developed which can give an accurate prediction of fracture initiation and near wellbore propagation mechanism.

**Facilities required (if any):** Abaqus Software, which is available at Curtin University.

**References (if any):**

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<th>Name of the student</th>
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*For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain*
*Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au*
### Project No # 25

<table>
<thead>
<tr>
<th>Project Level:</th>
<th>UG/PG (any)</th>
<th>Group/Individual (any)</th>
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</thead>
<tbody>
<tr>
<td>Project Title:</td>
<td>Establishment of Protocol for Synthetic Sample Preparation for lab experimental studies in Petroleum Engineering Applications</td>
<td></td>
</tr>
<tr>
<td>Supervisor(s):</td>
<td>Vamegh Rasouli, Seyed Hassan Fallahzadeh</td>
<td></td>
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<td>Level of supervision expected</td>
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</table>

**Project outline and scope:**

Synthetic samples are usually prepared for doing several petroleum engineering tests such as various enhanced oil recovery (EOR) experiments, CO2 sequestration research, and petroleum geomechanics applications like hydraulic fracturing and sand production tests. The prepared synthetic sample should have specific properties for each of these applications. Samples are mostly made up of cement and sand, which are initially mixed with water to prepare the cement mortar. After that, some specific moulds are used to form the shape and size of the final sample, and then the samples are cured for some days. The preparation procedure and curing time and environment greatly influence the properties of the final sample. In this project different samples will be prepared with various cement-sand and cement-water ratios, in addition various curing procedures will be considered. When the samples are prepared, several tests will be done to measure the properties of each sample. Porosity, permeability, compressive and tensile strengths, stiffness, internal cohesion and friction angle, and elastic properties of the samples could be measured. The analysis of each sample properties and composition would present a unique procedure for preparing synthetic samples. The outcome of this project would provide a useful material for different petroleum engineering research applications.

**Expected Tasks:**

Preparing samples, performing various tests, analysing the results.

**Expected outcome:**

A unique synthetic sample preparation methodology will be developed to be used for various petroleum engineering research applications.

**Facilities required (if any):** Sample preparation equipment, porosity and permeability measurement equipment, tri-axial stress cell, which are available in Geomechanics laboratory of Petroleum Eng Department.

**References (if any):**

**Name of the student**

---

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain  
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 26

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<th>Project Level:</th>
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<table>
<thead>
<tr>
<th>Project Title:</th>
<th>An experimental study on the effect of WOB and RPM on the Rate of Penetration</th>
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</thead>
<tbody>
<tr>
<td>Supervisor(s):</td>
<td>Vamegh Rasouli, Bahman Joodi</td>
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<td>Level of supervision expected</td>
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</table>

Project outline and scope:
Applied Weight on Bit and rotary speed of the bit are the most important factors in drilling operations that need to be optimized for optimum drilling speed and cost. The Lab Scale drilling rig available at the Department of Petroleum Engineering will be used to drill in synthetic rock samples of different strengths at different speeds and WOB’s. All drillings will be performed by circulating water or polymer solutions as the drilling fluid. The mechanical properties of the rocks will be tested using an existing triaxial Hook’s Cell.

Expected Tasks:
- Calibration of the Drilling Lid
- Run a number of experiments on drilling different synthetic rock samples
- Compare the resulted optimum criteria with the existing correlations
- Prepare a final report.

Expected outcome:
A correlation will be obtained for optimum state of drilling that either justifies the existing correlations or improves them for the case of synthetic rocks.

Facilities required (if any)
The lab-scale drilling lid available at Geomechanics lab of Petroleum Eng Department
Hook Cell for rock strength measurement tests

References (if any):

Name of the student
**Project No # 27**

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<th>Project Level:</th>
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<th>Group/Individual.</th>
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<table>
<thead>
<tr>
<th>Project Title:</th>
<th>An experimental study to compare the performance of normal drag bits with high speed impregnated diamond bits</th>
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<tbody>
<tr>
<td>Supervisor(s):</td>
<td>Vamegh Rasouli, Bahman Joodi</td>
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<tr>
<td>Level of supervision expected</td>
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</table>

**Project outline and scope:**
Impregnated diamond bits are used mainly for harder rock drilling and their higher speed is favourable in most of the hard rock drilling applications. In this project a study will be performed on the performance of this kind of bit compared to the normal drag bits. The Lab Scale drilling rig available at the Department of Petroleum Engineering will be used for this study. The mechanical properties of the rocks will be tested using an existing triaxial Hook’s Cell. Synthetic fine grain Samples will be built to represent medium-hard rocks.

**Expected Tasks:**
- Calibration of the Drilling Lid
- Run a number of experiments using impregnated and normal drag bits.
- Compare the results and choose the best bit for synthetic medium hard rocks.
- Prepare a final report.

**Expected outcome:**
Selection of best bit and drilling parameters for optimized drilling in medium hard rocks.

**Facilities required (if any)**
The lab-scale drilling lid available at Geomechanics lab of Petroleum Eng Department
Hook Cell for rock strength measurement tests

**References (if any):**

**Name of the student**

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Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au*
Project No # 28

Project Level: UG/PG

Project Title: Numerical Modelling of Rock Mechanical Test using Discrete Element Method

Supervisor(s): Vamegh Rasouli, Bahman Joodi

Level of supervision expected

Project outline and scope:
Discrete Element Method (DEM) is a powerful tool for simulating rock behaviour. PFC2D will be used to simulate and match the unconfined and confined tests of rock samples. The results of lab based experiments performed will be used for comparison purposes. Some lab experiments may be needed to be done using the Hook’s cell to estimate mechanical properties of the rocks.

Expected Tasks:
- Learn basics of DEM and how to use PFC2D
- Perform lab experiments on rock samples
- Calibrate the numerical model to best match the experimental results
- Match the rock mechanical behaviour curves
- Prepare a final report.

Expected outcome:
A proper process to calibrate both the rock and its behaviour at different stresses.

Facilities required (if any)
Hook Cell available at Geomechanics labs of Petroleum Eng Department
PFC2D software

References (if any):

Name of the student

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Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 29
Project Level: UG/PG

<table>
<thead>
<tr>
<th>Project Title:</th>
<th>Studying the effect of Grain Shape on Rock Mechanical Properties of Simulated Rocks using Discrete Element Method</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supervisor(s):</td>
<td>Vamegh Rasouli, Bahman Joodi</td>
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<td>Level of supervision expected</td>
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Project outline and scope:
Discrete Element Method (DEM) can be used to simulate different rock samples. Normally circular (or Spherical) particles are used in an assembly to represent the rock body. Considering grain shape in the simulation can result in a better representation of the rock properties. Some lab experiments may be needed to be done using the Hook’s cell to estimate mechanical properties of the rocks.

Expected Tasks:
- Learn basics of DEM and how to use PFC2D
- Perform lab experiments on synthetic rock samples prepared from different grain shapes
- Simulate the rocks considering the grain shapes
- Calibrate the numerical model to best match the experimental results
- Match the rock mechanical behaviour curves and compare the results with circular particles
- Prepare a final report.

Expected outcome:
Importance of grain shape in DEM simulation of rocks.

Facilities required (if any)
Hook Cell available at Geomechanics labs of Petroleum Eng Department
PFC2D software

References (if any):

Name of the student

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Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
**Project outline and scope:**
Experimental project to design and build a multiphase flow loop with sand injection capability and perform experiments to detect sand particles under different flow regimes.

**Expected Tasks:**
1. Assistance in design and build of flow loop and sand injection system.
2. Characterisation of sand detectors
3. Development of sand detection algorithms
4. Presentation and discussion of results with Chevron ETC.

**Expected outcome:**
Improved understanding of sand detectors and integration of sensors to state of the art detection capability

**Facilities required (if any)**
Flow loop in building 614

**References (if any):**

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 31

Project Title: Project: Rock Typing in tight gas reservoirs using evaluation of log, routine core and special core analysis

Supervisor(s): Hassan Bahrami, Reza Rezaee

Project outline and scope:
You will need to evaluate Whicher Range tight gas data related to core and logs to evaluate the rock types and flow units.

Knowledge of petrophysics and core analysis is essential.

Expected Tasks:
- Literature review and learning from previous studies
- Whicher Range Field data preparation, summary and analysis
- Analysis of your results to identify rock types for the Whicher Range reservoir sub-layers
- Identifying productivity of the different rock types

Expected outcome:
- Flow units and rock-types of Whicher Range field, and identifying the completion strategy for each flow unit

References (if any):
The previously published SPE or journal papers related to the topic, and Whicher Range field study report

Name of the student
For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain  
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au

### Project No # 32

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<tr>
<th>Project Level:</th>
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<th>Group/Individual.</th>
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<tbody>
<tr>
<td>Project Title:</td>
<td>Effect of phase behaviour on tight gas reservoirs productivity</td>
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<tr>
<td>Supervisor(s):</td>
<td>Hassan Bahrami, and Mofazzal Hossain</td>
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</tbody>
</table>

**Project outline and scope:**

- Effect of phase behaviour in tight gas reservoirs, on well productivity (gas phase behaves differently under tight formation conditions, compared with conventional reservoirs)

**Expected Tasks:** Literature review on the topic, and running reservoir simulation models

**Requirements (expected knowledge, and skill level):** PVT analysis knowledge, reservoir simulation

**References (if any):**

**Assigned Student(s) (if any):**
<table>
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<tr>
<th>Project No # 33</th>
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<td><strong>Project Level:</strong></td>
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<td><strong>Project Title:</strong></td>
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<td><strong>Supervisor(s):</strong></td>
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**Project outline and scope:**

- CBM welltest during DST tests show very high skin factor, and the research should show what the reason is. One of the theories is closure of natural fractures connected to wellbore, when pressure drops sharply during DST drawdown. The closure of the natural fractures may show high skin factor, which may not be a damage skin. The factors causing high skin factor need to be studied.

**Expected Tasks:** Literature review on the topic, and running reservoir simulation models

**Requirements (expected knowledge, and skill level):** Geomechanics knowledge, reservoir simulation using CMG-STARS

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain  
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
**Project No # 34**

<table>
<thead>
<tr>
<th>Project Level:</th>
<th>UG / MSc</th>
<th>Individual</th>
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</table>

**Project Title:** Evaluation of damage severity and its extent around wellbore in Coal Seam Gas reservoirs  
**Supervisor(s):** Hassan Bahrami, Mofazzal Hossain  
**Level of supervision expected:**

**Project outline and scope:**  
You will derive equations related to skin factor, and use reservoir simulation integrated with pressure build-up analysis for estimation of damage severity (damaged zone permeability, Kd) and damage zone extent around wellbore (damaged zone radius, Rd). You will provide a methodology and workflow on how to calculate Kd and Rd. The required software will be provided. Eventually, you will make problem more specific defined for Coal Seam Gas reservoirs.

You need good knowledge of reservoir engineering, welltest analysis and reservoir simulation IFLO (or CMG) program for this project.

**Expected Tasks:**  
- Literature review and learning from previous studies  
- Summary and analysis of the simulation outputs for effect of damaged zone perm and radius on pressure build-up response  
- CSG welltest response analysis

**Expected outcome:**  
- Provide methodology on how to estimate damaged zone perm and radius in a damaged well during drilling or fracturing

**References (if any):**  
The previously published SPE or journal papers related to the topic (refer to APPEA 2013 papers)

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<th>Name of the student</th>
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For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain  
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 35

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<th>Individual</th>
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<tr>
<th>Project Title:</th>
<th>Project: Rate transient analysis in shale gas reservoirs to estimate fracture size, stimulated reservoir permeability and optimum well spacing</th>
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<tbody>
<tr>
<td>Supervisor(s):</td>
<td>Hassan Bahrami, Mofazzal Hossain</td>
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</table>

Project outline and scope:
You will need to generate data using reservoir simulation for a fractured well and analyse the data using the rate transient analysis methods to estimate fracture size and stimulated reservoir permeability considering different shapes of drainage area. The software will be provided.

You need good knowledge of reservoir engineering, welltest analysis and reservoir simulation for this project (KAPPA-RUBIS program).

Expected Tasks:
- Literature review and learning from previous studies
- Understanding the drainage area, flow regimes and the equations in fractured shale reservoirs
- Running simulation models to confirm the validity of the derived equations

Expected outcome:
- Methodology and workflow for welltest and rate transient analysis
- Optimum well spacing and fracture spacing in multi-fractured shale reservoirs

References (if any):
The previously published SPE or journal papers related to the topic

Name of the student |
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<thead>
<tr>
<th>Project Title:</th>
<th>Welltest analysis based on linear and elliptical flow data in tight gas fractured</th>
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<tr>
<td>Supervisor(s):</td>
<td>Hassan Bahrami, Mofazzal Hossain</td>
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<td>Level of supervision expected</td>
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</table>

**Project outline and scope:**
You will use solution of the diffusivity equation for linear and elliptical flow regimes, and also radial flow regime, modify them for multi-fractured wells, to analysis welltest data of Whicher Range tight gas well. The data and the software will be provided.

You need good knowledge of reservoir engineering, welltest analysis and reservoir simulation for this project. Must be familiar with KAPPA softwares.

**Expected Tasks:**
- Literature review and learning from previous studies
- Welltest analysis of multi-fractured wells in tight reservoir

**Expected outcome:**
- Welltest analysis methodology for multi-fractured tight gas reservoir
- Analysis of Whicher Range welltest data

**References (if any):**
The previously published SPE or journal papers related to the topic, and Whicher Range field study report

**Name of the student**
Project No # 37

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<thead>
<tr>
<th>Project Level:</th>
<th>MSc</th>
<th>Individual</th>
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<tbody>
<tr>
<td>Project Title:</td>
<td>Estimation of original gas in place and recoverable gas in place for Whicher Range tight gas field using probabilistic and deterministic methods</td>
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<tr>
<td>Supervisor(s):</td>
<td>Hassan Bahrami, Mofazzal Hossain</td>
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</table>

**Project outline and scope:**
You will need to do the gas in place estimation for Whicher Range tight gas field using different methods (deterministic, probabilistic, material balance), report them according to the latest SPE PRMS reserve reporting standard. The data and the software will be provided.

You need good knowledge of reservoir engineering and reservoir simulation, familiar with KAPPA RUBIS and Crystall Ball, for this project.

**Expected Tasks:**
- Literature review and learning from previous studies
- Field data preparation, summary and analysis
- Summarizing your data in the required format, and prepare histogram plots
- Calculate GIP using different methods

**Expected outcome:**
- Reporting gas in place for different reservoir zones in Whicher Range tight gas field

**References (if any):**
The previously published SPE or journal papers related to the topic, and Whicher Range field study report

**Name of the student**
**Project No # 38**

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<tr>
<th>Project Title:</th>
<th>Project 6: Evaluation of condensate banking in different reservoir compartments of Whicher Range tight gas field using PVT modelling</th>
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<tbody>
<tr>
<td>Supervisor(s):</td>
<td>Hassan Bahrami, Mofazzal Hossain</td>
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<td>Level of supervision expected</td>
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</table>

**Project outline and scope:**
You will need to study PVT data and build the PVT model for different zones of Whicher Range tight gas reservoir. Then the PVT models should be import to a reservoir simulation model based on Whicher Range conditions, and be run for condensate banking damage effect. The data and the software will be provided.

You need good knowledge of reservoir engineering, PVT analysis and reservoir simulation for this project.

**Expected Tasks:**
- Literature review and learning from previous studies
- Fluid data summary and analysis
- PVT models (including Dew Point pressure) for different zones of Whicher Range using different equations of states or correlations

**Expected outcome:**
- Effect of condensate banking issue on productivity of Whicher Range wells

**References (if any):**
The previously published SPE or journal papers related to the topic, and Whicher Range field study report

**Name of the student**
Project No # 39

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<th>Project Level:</th>
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<tbody>
<tr>
<td>Project Title:</td>
<td>History matching, Production forecasting, and economical evaluations of Whicher Range tight gas field</td>
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<tr>
<td>Supervisor(s):</td>
<td>Hassan Bahrami, Mofazzal Hossain</td>
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<td>Level of supervision expected</td>
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</table>

Project outline and scope:
You will need to use Whicher Range reservoir model, history match each zone (by changing the perm, skin factor, etc) based on available DST data, and generate a new production profile. Separately, history match should be done based on PLT data. The results should identify the actual productivity of each zone, to be used for production forecast. The production forecast will be used for economical evaluations. The data and the software will be provided.

You need good knowledge of reservoir engineering, petrophysics and reservoir simulation for this project.

Expected Tasks:
- Literature review and learning from previous studies
- Field data preparation, summary and analysis
- History match based on DST data
- Generate production profile based on the DST history matched model, and compare with PLT data
- Use the final history matched model for production forecasting

Expected outcome:
- Production forecast for Whicher Range typical wells, economical evaluations

References (if any):
The previously published SPE or journal papers related to the topic, and Whicher Range field study report

Name of the student

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 40

Project Level: UG / MSc  Individual

Project Title: Effect of Cap Rock characteristics on long term performance of CO2 sequestration

Supervisor(s): Hassan Bahrami, Stefan Iglauer

Level of supervision expected

Project outline and scope:
You will need to study and learn about typical characteristics of a cap rock for a CO2 sequestration project. After knowing that, you will use reservoir simulation model to see how the characteristics affect the CO2 sequestration projects (leakage over 100s of years). The software will be provided.

You need good knowledge of reservoir engineering, geomechanics, petrophysics and reservoir simulation for this project, plus knowledge of CO2 sequestration, Familiar with RUBIS and IFLOW.

Expected Tasks:
- Literature review and learning from previous studies
- Field data preparation, summary and analysis
- Running a simulation model, that is built based on a typical water saturated formation candidate for CO2 sequestration project.
- Analysis simulation results

Expected outcome:
- Understanding how the long term performance of CO2 sequestration is affected by Cap Rock characteristics

References (if any):
The previously published SPE or journal papers related to the topic

Name of the student

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 41

Project Level: MSc Individual

<table>
<thead>
<tr>
<th>Project Title:</th>
<th>Evaluation of the damage mechanisms during drilling and fracturing in Whicher Range tight gas reservoir using relative permeability curves, core permeability, and welltest permeability.</th>
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<tbody>
<tr>
<td>Supervisor(s):</td>
<td>Hassan Bahrami, Reza Rezaee</td>
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<tr>
<td>Level of supervision expected</td>
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Project outline and scope:
You will need to work on relative permeability curves, core permeability, and welltest permeability, and compare the numbers to understand the actual effective permeability of the reservoir, then to comment on what damages the reservoir permeability. The data and the software will be provided.

You need good knowledge of reservoir engineering, petrophysics and reservoir characterization for this project.

Expected Tasks:
- Literature review and learning from previous studies
- WR field core and test data summary and analysis
- Analysis of your results
- Identifying source of the low productivity of Whicher Range wells

Expected outcome:
- The main reasons that make the effective permeability of Whicher Range to be low

References (if any):
The previously published SPE or journal papers related to the topic, and Whicher Range field study report

Name of the student
Project No # 42

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<thead>
<tr>
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<th>UG, MSc</th>
<th>Individual</th>
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<tbody>
<tr>
<td>Project Title:</td>
<td>Evaluation of wellbore instability issues and geomechanical properties in different wells of Whicher Range tight gas field</td>
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<tr>
<td>Supervisor(s):</td>
<td>Hassan Bahrami, Mohammad Sarmadivaleh, Mofazzal Hossain</td>
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<td>Level of supervision expected</td>
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Project outline and scope:
You will need to study wellbore instability issues in Whicher Range wells, and the geomechanical properties and down-hole stresses effect, knowing the wells drilling conditions. You need to be able to comment on why wellbore instability in some wells of Whicher Range is more severe than the other wells. The outputs will be used in well planning and optimization. The data will be provided.

You need good knowledge of reservoir engineering, geomechanics and petrophysics.

Expected Tasks:
- Literature review and learning from previous studies
- Summary, plotting and analysis of wellbore instability and breakouts.
- Correlating wellbore instability with other factors such as drilling conditions, downhole stresses, etc.

Expected outcome:
- Understanding what caused wellbore instability and the reason for large breakouts in some of the Whicher Range wells, and less severe break outs in some other wells.

References (if any):
The previously published SPE or journal papers related to the topic, and Whicher Range field study report

Name of the student
Project No # 43

Project Level: UG /PG

Project Title: Review of Hydraulic Fracturing in Shale Gas Reservoirs

Supervisor(s): Hassan Fatahi, and Mofazzal Hossain,

Level of supervision expected

Project outline and scope:
Review study on the progress made since the beginning of Hydraulic Fracturing in Shale Gas Reservoirs, state of the art of science and technology for the exploitation of shale gas reservoir. Emphasis should be given on: the various technologies practiced by the industries; and in-depth understanding of methods towards the production improvements; and understanding of relative advantages and disadvantages.

Expected Tasks:
Prepare a Literature review

Expected outcome:
Investigation of what has been done so far to increase gas production from shale gas reservoirs in terms of advancements in Hydraulic Fracturing Phase of well development.

Facilities required (if any),

References (if any):
Thirty Years of Gas Shale Fracturing: What Have We Learned?
George E. King, Apache Corporation
SPE 133456

Name of the student

For further information please contact UG/PG Project Coordinator, Dr. Mofazzal Hossain
Tel: (08) 9266 4990, Email: md.hossain@curtin.edu.au
Project No # 44

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<th>Project Level:</th>
<th>UG /PG</th>
<th>Individual.</th>
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<tr>
<th>Project Title:</th>
<th>Review of simulation of naturally fractured reservoirs</th>
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<tr>
<td>Supervisor(s):</td>
<td>Hassan Fatahi, and Mofazzal Hossain,</td>
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<tr>
<td>Level of supervision expected</td>
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**Project outline and scope:**
A literature review of the Progress of Hydraulic fracture stimulation in naturally fractured reservoirs since its inception.

**Expected Tasks:**
Prepare a Literature review

**Expected outcome:**
Investigation of what has been done so far to simulate hydraulic fracturing in naturally fractured reservoirs. What are the dependencies and weaknesses; what needs to be done to improve, with an emphasis on the application, for shale gas reservoirs.

**Facilities required (if any)**

**References (if any):**
Simulating Hydraulic Fracturing in Real Fractured Rock - Overcoming the Limits of Pseudo3D Models
Neal Nagel, Ivan Gil....
SPE 140480

**Name of the student**