CSIRO Undergraduate Vacation Scholarships – Minerals Resources

- Get hands on research experience
- Access CSIRO’s world-class facilities
- Apply for a CSIRO Vacation Scholarship today!

The 2015/16 CSIRO Vacation Scholarship Program is designed to provide students with the opportunity to work on real-world problems in a leading R&D organisation. Participation in the Vacation Scholarship Program has influenced previous scholarship holders in their choice of further study and future career options. Many have gone on to pursue a PhD in CSIRO or to build a successful research career within CSIRO, a university or industry.

The Mineral Resources Flagship works closely with industry partners to deliver innovation to grow Australia’s resource base, increase productivity and drive environmental performance. For more information please see our website at Mineral Resources Flagship.

Location: Clayton, VIC and North Ryde/Lindfield, NSW (refer to list of projects for specific details)
Projects: for a description of all projects available please click here
Scholarship: $1462.77 per fortnight
Duration: 8 to 12 weeks from November 2015 to February 2016
Reference: 1581

Pre-Requisites/Eligibility

Vacation scholarships are open to students who:

- are currently enrolled at an Australian university;
- have completed three years of a full-time undergraduate course, preferably in science or engineering (however exceptional second year students may be considered);
- have a strong academic record (credit average or higher); and
- intend to go on to honours and/or postgraduate study.

About CSIRO: The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia’s national science agency. At CSIRO we shape the future. We do this by using science to solve real issues. Our research makes a difference to industry, people and the planet. Find out more at www.csiro.au.

Applications close on: Sunday 16 August 2015
Position Details

<table>
<thead>
<tr>
<th><strong>Job Title:</strong></th>
<th>CSIRO Undergraduate Vacation Scholarships – Minerals Resources Flagship</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Reference No:</strong></td>
<td>1581</td>
</tr>
<tr>
<td><strong>Classification:</strong></td>
<td>CSOF1.1</td>
</tr>
<tr>
<td><strong>Stipend:</strong></td>
<td>$1462.77 per fortnight</td>
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<tr>
<td><strong>Location:</strong></td>
<td>Please refer to the List of Projects at the end of this document</td>
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<td><strong>Tenure:</strong></td>
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<tr>
<td><strong>Project Description:</strong></td>
<td>Please refer to the list of Projects on the following pages of this document. If you require further information please contact the person listed as the contact for the project.</td>
</tr>
<tr>
<td><strong>How to Apply:</strong></td>
<td>Please apply for this position online at <a href="http://www.csiro.au/careers">www.csiro.au/careers</a></td>
</tr>
</tbody>
</table>

You will be required to:

1. list your **top 2 research projects** in order of preference;
2. submit a **CV** which includes:
   - the reasons why the research project/s you have selected are of interest to you; and how your previous skills/knowledge and experience meets the project requirements; and
   - an outline of your longer-term career aspirations and detail how this program will help you achieve them.
3. upload your **academic results**.

**Referees:** Please ensure that your resume includes the name and contact details of your academic supervisor and at least one other referee (work or university).

If you experience difficulties applying online call 1300 984 220 and someone will be able to assist you. Outside business hours please email: csiro-careers@csiro.au.

*Please do not email your application. Applications received via this method may not be considered.*
<p>| About CSIRO:                      | The Commonwealth Scientific and Industrial Research Organisation (CSIRO) is Australia’s national science agency. At CSIRO we shape the future. We do this by using science to solve real issues. Our research makes a difference to industry, people and the planet. |</p>
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<tr>
<th>Project Number</th>
<th>Minerals Resources Flagship – Vacation Scholarships Project Details</th>
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</table>
| MR01           | **Project Title**  
Production of Ti alloys using fluidised bed reactor  

**Project Description**  
Investigate the feasibility of producing a Ti-Pd alloy by reducing titanium tetrachloride with a Pd doped magnesium powder in a fluidised bed reactor.  

**Project Duties/Tasks**  
- Characterise the feed Pd doped magnesium powder  
- Operate the laboratory scale continuous fluidised bed reactor  
- Conduct vacuum distillations to separate the Ti-Pd alloy from the MgCl₂ by-product  
- Characterise the final metal product  

**Relevant Fields of Study**  
- Chemical Engineering  
- Process Engineering  
- Materials Engineering  

**Location:** Clayton, VIC  
**Contact:** Dr Christian Doblin on (03) 9545 8658 or email christian.doblin@csiro.au

| MR02           | **Project Title**  
Megasonics: a new method for the separation of metal-organic frameworks.  

**Project Description**  
The aim of this project is to conduct an experimental study of different process configurations for the separation and activation stages required for the large scale production of metal-organic frameworks (MOFs) using megasonics, a new approach developed at CSIRO.  

**Project Duties/Tasks**  
This project consists mainly of experimental work:  
- Reaction study: Perform MOF synthesis using flow chemistry to gain ‘hands-on experience’ with MOF materials and to understand the requirements for high quality production.  
- Megasonics study: Perform systematic screening of parameters such as ultrasound frequencies, temperature, solvents and different alignments of the transducers within the reactor to study their effect on MOF separation and purification.  
- Design a set-up to incorporate megasonics in a larger scale process  

**Relevant Fields of Study**  
- Chemical Engineering  

**Location:** Clayton, VIC  
**Contact:** Marta Rubio Martinez on (03) 9545 8546 or email marta.rubio@csiro.au
There are two projects described in the document:

### MR03

**Project Title**
Cost, embodied energy and water footprint of a coal processing plant

**Project Description**
The Process Evaluation Team assesses life cycle based environmental impact of new and conventional technologies for mineral processing. As part of extending to fuel processing, a coal processing flowsheet will be evaluated based on life cycle assessment (LCA methodology) including the effect of a new technology on the impact of energy and water footprints.

**Project Duties/Tasks**
- Compile input data for selected coal flowsheets ('Mine to Port') that includes coal mining and coal washing and preparation plant. This will include materials, chemical and utilities for coal mining and coal washing plant (e.g. natural gas, electricity, water, other types of fuel) in Australia and elsewhere
- Prepare life cycle inventory (LCI) tables based on the input data
- Set up life cycle assessment models and determine embodied energy and water footprint per tonne of coal ready to be shipped
- Compare a new technology such as ‘Dry processing’ with wet processing.
- Deliverables are an Excel model, a short report and a presentation at CSIRO.

**Relevant Fields of Study**
- Chemical Engineering
- Mining Engineering
- Mineral Processing Engineering
- Environmental Engineering

**Location:** Clayton, VIC

**Contact:** Dr Nawshad Haque on (03) 9545 8931 or email Nawshad.Haque@csiro.au

### MR04

**Project Title**
Compilation of historical and projected price data of fuel, labour and utilities

**Project Description**
The process Evaluation Team undertakes techno-economic evaluation of new and conventional technologies for mineral industry. The maintenance of an updated database is an important part of this capability.

**Project Duties/Tasks**
- Compile the historical, current and projected data from various available sources, including:
  - Utilities for chemical and mineral processing plant (e.g. natural gas, electricity, water, other types of fuel) in Australia and elsewhere
  - The hourly cost of labour for Australia and some key selected international locations.
  - Cost data for selected chemicals in mineral and metal processing plants.
  - Currency exchange rate ($AU/$US) from Reserve Bank of Australia’s open data sources and other sources for short term prediction.
- Based on the historical data, develop some projections and correlations that can be used for future evaluation studies.
- Deliverables will be a Microsoft Excel or Access database, a short report and a presentation at CSIRO.
<table>
<thead>
<tr>
<th>MR05</th>
<th>Project Title</th>
<th>Embodied energy and water footprint of selected copper and gold flowsheets</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Project Description</td>
<td>The Process Evaluation Team assesses life cycle based environmental impact of new and conventional technologies for mineral processing. Selected copper and gold flowsheets will be evaluated based on life cycle assessment (LCA methodology), including the effect of new technology such as high pressure grinding rolls (HPGR).</td>
</tr>
<tr>
<td></td>
<td>Project Duties/Tasks</td>
<td></td>
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</tbody>
</table>
  - Compile input data for selected copper and gold flowsheets ('Mine to Metal'). This will include materials, chemical and utilities for mining and mineral processing plant (e.g. natural gas, electricity, water, other types of fuel) in Australia and elsewhere  
  - Prepare life cycle inventory (LCI) tables based on the input data  
  - Set up life cycle assessment models and determine embodied energy and water footprint per tonne of copper and gold metal  
  - Deliverables are an Excel model, a short report that can be converted to a journal article, and a presentation at CSIRO. |
| Relevant Fields of Study | Chemical Engineering  
  Mining Engineering  
  Mineral Processing Engineering  
  Environmental Engineering |
| Location: | Clayton, VIC |
| Contact: | Dr Nawshad Haque on (03) 9545 8931 or email Nawshad.Haque@csiro.au |

<table>
<thead>
<tr>
<th>MR06</th>
<th>Project Title</th>
<th>The development of novel ionic liquid polymers as advanced functional coatings for catalysis, energy and environmental remediation applications.</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Project Description</td>
<td>The project involves using electrochemical techniques to polymerise and deposit novel materials known as poly(ionic liquid)s. The student will have access to advanced nanocharacterisation techniques to examine the properties of the polymer coatings.</td>
</tr>
<tr>
<td></td>
<td>Project Duties/Tasks</td>
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</table>
  - Use electrochemistry to graft ionic liquid-based polymers to electrode surfaces.  
  - Optimise the monomer formulation to deliver enhanced physical and chemical properties.  
  - Characterise the polymer film using microscopy and spectroscopic techniques. |
| Relevant Fields of Study | Chemical Engineering  
  Mining Engineering  
  Mineral Processing Engineering  
  Environmental Engineering |
<p>| Location: | Clayton, VIC |
| Contact: | Dr Nawshad Haque on (03) 9545 8931 or email <a href="mailto:Nawshad.Haque@csiro.au">Nawshad.Haque@csiro.au</a> |</p>
<table>
<thead>
<tr>
<th>MR07</th>
<th>Project Title</th>
<th>Screen-printed electrochemical sensor arrays</th>
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</thead>
<tbody>
<tr>
<td></td>
<td>Project Description</td>
<td>Prepare novel ink formulations for screen-printed electrochemical sensor arrays. Electrodes will be characterised using range of advanced electrochemical and imaging techniques.</td>
</tr>
</tbody>
</table>
|      | Project Duties/Tasks | • Preparing screen-printed electrodes  
• Characterising sensor surface  
• Studying the analytical response of the sensors |
|      | Relevant Fields of Study | • Chemistry  
• Materials Science  
• Nanotechnology |
|      | Location: | Clayton, VIC |
|      | Contact: | Jean-Pierre Veder on (03) 9545 8508 or email Jean-Pierre.Veder@csiro.au |

<table>
<thead>
<tr>
<th>MR08</th>
<th>Project Title</th>
<th>Uncover Cloncurry</th>
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<tbody>
<tr>
<td></td>
<td>Project Description</td>
<td>Our project will use new methodologies, workflows and instrumentation being developed by CSIRO to construct a district-scale mineral systems model by integrating petrophysics and mineralogy at the sample to grain-scale to shed new light on the interrelationships between structure, petrophysics, mineralogy and geochemistry. Techniques include petrophysical analyses, e.g., density, remanent magnetisation, susceptibility; anisotropy of magnetic susceptibility (AMS), and mineral mapping techniques, e.g., micro X-ray fluorescence (μXRF), rapid scanning electron microscopy (SEM) and micro X-ray computed tomography (μCT). The insights gained at a deposit-scale can be applied to understand the mineral system as whole. This will be facilitated by an internally consistent dataset whereby all the samples are analysed in a consistent manner, allowing direct comparison between deposits. The project will focus on ~20 deposits and related prospects and footprints across the Mount Isa Eastern Succession, including: structurally controlled Cu-Au deposits, carbonate-hosted Cu-Au deposits, ironstone hosted Cu-Au and Pb-Zn deposits, pyrrhotite-rich and gold-rich “IOCGs”, magnetite-rich IOCGs and Mo-REE deposits.</td>
</tr>
<tr>
<td></td>
<td>Project Duties/Tasks</td>
<td>• Conduct field work in remote areas to collect geological samples for palaeomagnetic and geochemical/mineralogical studies</td>
</tr>
</tbody>
</table>

|      | Relevant Fields of Study | • Chemistry  
• Materials Science  
• Nanotechnology  
• Environmental Technology |
|      | Location: | Clayton, VIC |
|      | Contact: | Mikko Vepsalainen on (03) 9545 8802 or email mikko.vepsalainen@csiro.au |
- Prepare samples for petrophysical, geochemical and mineralogical analyses; and conduct petrophysical analyses
- Integrate petrophysical data from a wide range of sources, with other available datasets, e.g. mineralogical, geochemical
- Compile results and apply the findings to geophysical modelling of ore deposits and to regional mineral systems studies

**Relevant Fields of Study**
- Geoscience, with specialisation in magnetic geophysical methods and interpretation

**Location:** North Ryde, NSW (and/or Lindfield, NSW)
**Contact:** Jim Austin on (02) 9490 8876 or email James.Austin@csiro.au (email preferred)

<table>
<thead>
<tr>
<th>MR09</th>
<th>Project Title</th>
<th>Customer Analysis</th>
</tr>
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<tbody>
<tr>
<td></td>
<td><strong>Project Description</strong></td>
<td>Building a customer profile of CSIRO’s top customers.</td>
</tr>
</tbody>
</table>
|      | **Project Duties/Tasks** | - Conduct customer analysis of top customers with a mining industry focus  
- Map current CSIRO customer engagement with our current projects  
- Scope potential customer interest areas for potential future engagement |
|      | **Relevant Fields of Study** | Engineering or science combined with another area such as law, commerce or marketing. |
|      | **Location:** | Clayton, VIC |
|      | **Contact:** | Hun Gan on (03) 9545 8510 or email liz.eadie@csiro.au |

<table>
<thead>
<tr>
<th>MR10</th>
<th>Project Title</th>
<th>Technology Market Analysis</th>
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<tbody>
<tr>
<td></td>
<td><strong>Project Description</strong></td>
<td>Conduct market and patent analyses of CSIRO’s technologies in the mining space.</td>
</tr>
</tbody>
</table>
|      | **Project Duties/Tasks** | - Review technologies in the Minerals Resources Flagship, conduct market analysis and assess commercial opportunities for selected technologies  
- Conduct patent landscape searching of selected technologies to look for opportunities for and potential blocks to future research and potential licensees  
- Investigate pathways for future collaborations for selected technologies |
|      | **Relevant Fields of Study** | Engineering or science combined with another area such as law, commerce or marketing. |
|      | **Location:** | Clayton, VIC |
|      | **Contact:** | Liz Eadie on (03) 9545 8510 or email liz.eadie@csiro.au |