UQ Summer Research Project Description

Project title:	Physical modelling of wave run up, overtopping and beach erosion on reef-protected beaches
Project duration: **Summer: 6-10 weeks** **Winter: 4-6 weeks**	Summer: 6-10 weeks to suit student commitments
Description:	Coral reefs protect many of the world's beaches, but are subject to degradation through coral loss due to climate change and human impact. In addition, sea level rise reduces the degree of protection afforded by such systems. This project will perform physical experiments in the wave flumes in the Hydraulics laboratory to investigate wave run-up, overwash and sediment transport processes across and behind fringing or barrier reef systems. A sandbag and paving stone reef will be constructed on the existing beach face. Water levels, tide and wave conditions will be varied. Data will be collected by wave gauges, with sediment transport measured through bathymetry changes using a laser-based beach profile system. Prior background in coastal engineering is not essential, but clearly useful. Work will be performed in collaboration with PhD students in the UQ coastal group. Students can present their work at the weekly coastal meetings to improve their presentation and communication skills. Data skills will include using existing Matlab, or writing new code, and Excel for analysis.
Expected outcomes and deliverables:	Learning new physical modelling skills in coastal engineering, free surface flows and sediment transport Working within a team and analysing and presenting new data New data on beach behaviour which cannot be collected in the field Report on experiments, data collected and outline analysis of results.
Suitable for:	3rd-4th year students who have taken Fluid Mechanics, with Catchment Hydraulics, or Coastal Engineering courses or Advanced Open Channel Flow an advantage but not essential. The project work can be undertaken individually or within a pair.
Primary Supervisor:	Prof Tom Baldock
Further info:	Contact Tom Baldock, t.baldock@uq.edu.au

UQ Summer Research Project Description

Project title:	**Water Quality Assessment of Shallow Lake Systems**
Project duration: **Summer: 6-10 weeks** **Winter: 4-6 weeks**	6-10 weeks
Description:	*This project focuses on collation and analysis of water quality data for shallow urban lake systems in South East Queensland with the aim of assessing whether current water quality guidelines are appropriate for these systems. This will also include an opportunity to collect and analyse water quality information from the lakes on the University of Queensland's St Lucia campus.*
Expected outcomes and deliverables:	*The key outcome of the project will be a written report that includes a literature review of existing approaches to assessment and management of shallow lakes along with a synthesis of past water quality data.*
Suitable for:	The project is suitable for students with a background in environmental, civil or chemical engineering.
Primary Supervisor:	*Dr Badin Gibbes*
Further info:	For further information please contact Dr Badin Gibbes via b.gibbes@uq.edu.au

UQ Summer Research Project Description

Project title:	**Physical modelling of hydraulic structures**
Project duration: **Summer: 6-10 weeks** **Winter: 4-6 weeks**	6 weeks
Description:	Theoretical and numerical studies of turbulent flows in hydraulic structures are complicated by the large number of relevant equations: i.e., three basic equations (continuity, momentum, energy), plus a mass transfer equation. Most studies rely upon some physical experiments with sophisticated instrumentations. Laboratory model studies are performed under controlled flow conditions with geometrically similar models. Hydraulic investigations will be conducted in the AEB hydraulics laboratory to predict the hydrodynamic performances of man-made structures. The project will aim to characterise the turbulence and the effects of flow turbulence on the optimum flow conditions.
Expected outcomes and deliverables:	The work will be conducted in the AEB hydraulic research laboratory. The student(s) will conduct some research experiments under academic supervision in a world-known research laboratory. They/he/she will gain skills in modelling and data processing, together with some critical analysis of the results. Student(s) may also be asked to produce a report or oral presentation at the end of the project.
Suitable for:	Suitable for Civil and Environmental Engineering students who successfully completed course in Fluid Mechanics (UQ equivalent: CIVL2131), and preferably Open Channel Hydraulics (UQ equivalent: CIVL3140), and are likely undertake a CIVL4580/4582 Research thesis or CIVL4560 Project in 2020, starting in semester 1. **Preference will be given to highly motivated students.** The research project will place typically from 6 January to 21 February 2020. UQ enrolled students only. Pre-requisite: Successful completion of Fluid Mechanics courses equivalent to CIVL2131 Fluid mechanics.
Primary Supervisor:	Professor Hubert Chanson Dr Davide Wuthich
Further info:	For further information, contact Professor Hubert CHANSON: Room 49-553 h.chanson@uq.edu.au

UQ Summer Research Project Description

Project title:	**Experimental investigations of unsteady open channel flows**
Project duration: **Summer: 6-10 weeks** **Winter: 4-6 weeks**	6 weeks
Description:	A sudden decrease in water depth, called a negative surge or expansion wave, is characterised by a gentle change in free-surface elevation. Some geophysical applications include the ebb tide flow in macro-tidal estuaries, the rundown of swash waters and the retreating waters after maximum tsunami runup in a river channel. In the AEB hydraulics laboratory, new hydraulic engineering experiments will be conducted in a trapezoidal channel. The project will aim to characterise the unsteady turbulence during expansion waves as well as the effects of flow turbulence on boundary shear stress.
Expected outcomes and deliverables:	The work will be conducted in the new AEB hydraulic research laboratory. The student will conduct some research experiments under academic supervision in a world-known research laboratory. He/she will gain skills in data collection and data processing, together with some critical analysis of the results. Student may also be asked to produce a report or oral presentation at the end of the project.
Suitable for:	Suitable for Civil and Environmental Engineering students who successfully completed course in Fluid Mechanics (UQ equivalent: CIVL2131), and preferably Open Channel Hydraulics (UQ equivalent: CIVL3140), and are likely undertake a CIVL4580/4582 Research thesis or CIVL4560 Project in 2020, starting in semester 1. **Preference will be given to highly motivated students.** The research project will place typically from 6 January to 21 February 2020. UQ enrolled students only. Pre-requisite: Successful completion of Fluid Mechanics courses equivalent to CIVL2131 Fluid mechanics.
Primary Supervisor:	Professor Hubert Chanson Dr Davide Wuthich
Further info:	For further information, contact Professor Hubert CHANSON: Room 49-553 h.chanson@uq.edu.au

UQ Summer Research Project Description

Project title:	Real -time monitoring of water quality and the pump efficiencies in Pelican Waters at the Sunshine Coast
Project duration: **Summer: 6-10 weeks** **Winter: 4-6 weeks**	6 weeks
Description:	Pelican Waters is a major waterway system at the Sunshine Coast and an important infrastructure for residents and tourists. To prevent the build-up of freshwater in Pelican Waters the waterways are currently mixed with seawater taken from Pumicestone Passage. A recently installed monitoring system provides real-time monitoring of parameters such as salinity, temperature, PH, dissolved oxygen (DO) etc. and helps to assess the water quality over the annual cycle. However, pumping costs are relatively high and the retention time and water mixing processes in Pelican Waters is unknown, e.g., whether less pumping would be equally sufficient by supplying still enough saline water to the system.
Expected outcomes and deliverables:	This projects aims to analyse data collected in and optimize the pump operation by evaluating the water quality with newly installed water quality sensors. The work will be conducted by analysing collected data between March 2019 and December 2019. The student will conduct some fieldwork (boating & kayaking) under academic supervision at the Sunny Coast. He/she will gain skills in data collection and data processing, together with data analysis methods of the results. Student may also be asked to produce a report or oral presentation at the end of the project.
Suitable for:	Suitable for Civil and Environmental Engineering students who successfully completed course in Fluid Mechanics (UQ equivalent: CIVL2131), and preferably Open Channel Hydraulics (UQ equivalent: CIVL3140). **Preference will be given to highly motivated students.** The research project will place typically from 6 January to 21 February 2020. UQ enrolled students only. Pre-requisite: Successful completion of Fluid Mechanics courses equivalent to CIVL2131 Fluid mechanics.
Primary Supervisor:	Dr Remo Cossu
Further info:	For further information, contact Dr Remo Cossu: Room 49-451 r.ccossu@uq.edu.au

UQ Summer Research Project Description

Project title:	**Fracture characteristics of asphalt mixes using high-speed photography**
Project duration: **Summer: 6-10 weeks** **Winter: 4-6 weeks**	10 weeks
Description:	Fracturing in asphalt pavements is a nationwide problem faced by every road agency. While new test procedures and monitoring equipment are continuously being developed, a better understanding and quantification of cracking of asphalt remains topical. This project aims to investigate the failure response of asphalt mixes under various loading conditions (tensile and compressive stresses) captured at high frequencies using a stereo-pair of ultra-high speech camera system. Digital Image Correlation (DIC) will be then applied to understand crack initiation and crack propagation in asphalt mix designs for quality control and quality assurance of asphalt materials.
Expected outcomes and deliverables:	The applicants can expect to gain experience in the testing of geomaterials for use in design. Publication of the outcomes is likely and the project lends itself to a future undergraduate thesis or Masters project. Publication of the outcomes is likely and the project lends itself to a future undergraduate thesis or Masters project.
Suitable for:	Suitable for 3 and 4-year geotechnical engineering students with an interest in laboratory testing.
Primary Supervisor:	Dr Mehdi Serati, Dr Ian Van Wijk (Aurecon), and Professor David Williams
Further info:	Please email M.Serati@uq.edu.au for further details

UQ Summer Research Project Description

Project title:	**"Farming" to drain and desiccate red mud**
Project duration: ***Summer: 6-10 weeks***	10 weeks
Description:	Drainage and desiccation of red mud will be carried out in a 2,000 mm long by 600 mm wide by 600 mm deep tank exposed to the weather, with a weather station. A scaled amphirol will "farm" the red mud, and the red mud will be instrumented with moisture, suction, salinity and temperature sensors to monitor drainage and desiccation.
Expected outcomes and deliverables:	The applicants can expect to gain experience in sensor design, manufacture, calibration as well as the experience in physical modelling of the “farming” of red mud to facilitate drainage and desiccation. Publication of the outcomes is likely and the project lends itself to a future undergraduate thesis or Masters project.
Suitable for:	Suitable for 2 to 4-year geotechnical engineering students with an interest in laboratory testing.
Primary Supervisor:	Professor David Williams and Dr Chenming Zhang
Further info:	Please email Chenming.Zhang@uq.edu.au for further details

UQ Summer Research Project Description

Project title:	**Instrumented column testing of tailings slurries under laboratory and ambient weather conditions**
Project duration: ***Summer: 6-10 weeks***	10 weeks
Description:	Settling, self-weight consolidation and desiccation testing of tailings slurries will be carried out in a column measuring 200 mm in diameter by 1,200 mm in height. The column is instrumented with moisture, suction, salinity and temperature sensors, and sits on a balance to record the mass and water balances. Tests will be carried out in the laboratory and exposed to the weather, with a weather station.
Expected outcomes and deliverables:	The applicants can expect to gain experience in sensor design, manufacture, calibration and installation in a tailings column to monitor settling, self-weight consolidation and desiccation. Publication of the outcomes is likely and the project lends itself to a future undergraduate thesis, MPhil or PhD project.
Suitable for:	Suitable for 2 to 4-year geotechnical engineering students with an interest in experimental design.
Primary Supervisor:	Professor David Williams and Dr Chenming Zhang
Further info:	Please email Chenming.Zhang@uq.edu.au for further details