UCM UNIT FOR CONSTRUCTION MATERIALS

UNIVERSITEIT STELLENBOSCH UNIVERSITY

Division of Structural Engineering and Civil Engineering Informatics

MEng Research: Topics available in 2018 You are welcome to discuss the topics with the lecturers

No	Lecturer	Preliminary title of research project	Brief description of project	Bursary		Research material expenses	Workstation and internet costs
				1st year	2nd year		
UCM1	Prof WP Boshoff	Fabric Formed Concrete	Fabric Formed Concrete is a novel and modern approach to concrete shutters. Current production of concrete beams are limited to prismatic elements due to the limits of construction technology. Using fabric to shape the elements allows for optimised sections which is also more environmental friendly due to using less concrete and still give the same strength. Using this technology in combination with fibre reinforced concrete (FRC) has not been done before. This study will use FRC to reinforce fabric formed concrete elements. This work will include a large experimental programme. www.sun.ac.za/ucm	R 103 000	R 103 000 + Inflation	Covered	Provided
UCM2	Prof WP Boshoff	Using Waste Materials in Concrete	The production of cement has a significant negative impact on the environment. Some scholars believe cement production contributes as much as 7 % of the world carbon emissions. This project will look at common waste materials to replace a part of cement. This includes recycled clay bricks, recycled glass, bagasse ash etc. www.sun.ac.za/ucm	TBC	TBC	Covered	Provided
UCM3	Prof WP Boshoff	Creep of cracked Textile Reinforced Concrete	The UCM is part of a Rilem committee investigating the tensile creep of cracked fibre reinforced concrete (FRC). The creep of Textile Reinforced concrete (TRC) and type of FRC, has still to be investigated. TRC is a relatively thin material which consists of layers of mortar and woven fibre textiles/mats. They have superior behaviour in tension and flexure. This project entails the long term testing of TRC under creep loads. www.sun.ac.za/ucm	TBC	TBC	Covered	Provided
UCM4	Prof WP Boshoff	Using superabsorbent polymers (SAP) to improve the properties of fresh concrete	Superabsorbent polymers (commonly used in diapers) can store water in concrete and release it when it is needed. This can improve rheology, but more importantly, improve the plastic cracking behaviour. This work entails testing the fresh concrete behaviour with concrete containing SAP and identify the mechanisms whereby these SAP work. www.sun.ac.za/ucm	TBC	TBC	Covered	Provided
UCM5	Dr R Combrinck	Rheological concrete properties required for successful concrete placement	One of the main advantages of concrete is its ability to be shaped into any form while in the fresh state. However, defects such as honeycombing, segregation and incomplete compaction still occur during the placement process and have a significant negative impact on the overall cost and durability of any concrete structure. The successful casting and placement of concrete requires a concrete with suitable fresh properties for a specific application. The rheology of concrete provides a more scientific description of the fresh properties of concrete compared to the conventional slump test. This study should investigate the impact of rheology of fresh concrete on the successful casting and placement of numerous conventional and non-conventional concrete mixes.	One scholarship of R 103000 is available	One scholarship of R 103000 + inflation is available	Covered	Provided
UCM6	Dr R Combrinck	Influence of restraint on the cracking of plastic concrete	The cracking of plastic concrete occurs within the first few hours after concrete has been cast and includes both plastic settlement of plastic shrinkage cracks. The behaviour of these cracks is greatly influenced by the amount of restraint. Restraints include reinforcing steel, formwork and even the concrete itself. However, the influence of restraint on the cracking of plastic concrete is unknown. This study should investigate and propose a link between the type (and amount) of restraint and the severity of plastic cracking.			Covered	Provided
UCM7	Dr R Combrinck	Early age strength development of conventional and non-conventional concrete mixes exposed to different environmental conditions	Modern day concrete structures needs to be constructed quickly and effectively. The concrete must reach a specific strength as fast as possible to allow the stripping of formwork and supporting falsework. However, structural collapses can occur if the falsework is removed before the concrete has reached the required strength. With this in mind, this study should investigate the strength development with time of both conventional and non-conventional concrete mixes at different environmental conditions. This should include a variation in formwork type as well as cement type.			Covered	Provided
UCM8	Dr R Combrinck	Quantifying the effectiveness of preventative measures for the cracking of plastic concrete	The cracking of plastic concrete can result in serious and premature durability issues. However, these cracks can be prevented using preventative measures such as admixtures, fibres, SAP, curing, finishing techniques and casting procedures. These measures are often ineffective due to incorrect application. This study should investigate and quantify the effectiveness of these measures in preventing or reducing the cracking of plastic concrete.			Covered	Provided
UCM9	Ms W de Villiers	Investigating the structural response of single storey masonry walls built of alternative masonry units	Mechanical limits for conventional masonry units were developed using yield line theory and superseded loading conditions. To assist the development of alternative masonry units, the mechanical demands on masonry units in Category 1 Buildings need to be verified. This is done by producing adequate alternative masonry units and constructing full-scale masonry wall tests in the laboratory, including the simulation of wind and seismic loading.	One scholarship of R 103000 is available	One scholarship of R 103000 + inflation is available	Covered	Provided
UCM10	Ms W de Villiers	Determining mechanical demands on alternative masonry units for application in Category 1 Buildings	Mechanical limits for conventional masonry units were developed using yield line theory and superseded loading conditions. To assist the development of alternative masonry units, the mechanical demands on masonry units in Category 1 Buildings need to be verified. This is done using finite element analyses, taking into consideration the requirements of SANS 10160, including seismic loading, and the requirements of SANS 10400.			Covered	Provided