



# PhD Scholarships at Stellenbosch University in 3D Printed Concrete

## Scholarships

- Term: 1 Feb 2023 (or earlier) - 31 Dec 2025
- R150 000 per year for 3 years per scholarship  
(of which approximately R 30 000 and R60 000 can be expected to be spent on tuition fees and accommodation respectively)

## Minimum Requirements

- MEng (Civil/Structural Engineering)
- Proficiency in English (oral and written)
- Capacity to start on 1 Feb 2023 (or earlier)
- South African

## Recommended Experience

- Concrete technology - chemistry, microstructure and durability of cementitious materials
- Physical and experimental research and validation in concrete materials
- 3D concrete printing
- Computational modelling and finite element analysis

Furthermore, applicants must be highly motivated and enthusiastic researchers with excellent team working skills.

## Application Details

- CV
- Academic Record
- Links to thesis or published papers
- Supporting letter from current or previous supervisor

### Background

Stellenbosch University (SU) is a member of the ERA-MIN RecycleBIM consortium, a multi-national and multi-stakeholder project to create an integrated framework for circularity of raw materials of construction, leveraged on the information wealth brought about by Building Information Modelling (BIM).

SU's focus in this project is 3D printing and new opportunities for circularity, creating an inventory of construction and industrial waste materials with demonstrated compatibility for quality, viable 3D printed concrete (3DPC) structural elements towards high-technological construction circularity. Two PhD scholarships are available for the following two projects:

### Project 1

Main Deliverable: BIM of a high-quality R-3DPC structural element and manual for 3DP design to print process illustrated with realised elements and procured recycled ingredients.

This project focuses on extracting 3DPC structural elements from BIM models, purposefully slicing and digitizing them into the necessary layers for additive manufacturing, through to printing the final structural elements. SU Projects 1 and 2 will collaborate on the particular mix ingredients and designs used in the 3DPC. In the design of the structural elements, consideration must also be given to deconstruction, thereby increasing the opportunity for construction material circularity.

### Project 2

Main Deliverable: Mix design guidelines for durable 3D printable concrete containing recycled waste.

This project focuses on developing 3D printable mixes from recycled brick and concrete as partial replacement of natural aggregate and low-carbon cement as binder, while preserving the required pumpability, extrudability and buildability properties. SU Projects 1 and 2 will collaborate on the particular mix ingredients and design used in the 3DPC validation and demonstration. This project also includes cooperation with consortium partner, University of the Western Cape (UWC) in identifying and determining the compatibility and durability of these alternative materials.

Submit applications for Project 1 to Dr Wibke De Villiers and for Project 2 to Prof John Babafemi. Applications must be received by 14 October 2022 and applicants will be notified by 21 October 2022. Shortlisted candidates will be contacted for an online interview.

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