

The Department of Mechanical Engineering Science in the Faculty of Engineering and the Built Environment at the University of Johannesburg, presents a course and a presentation by **Prof Nicolin Govender**.



Prof Govender is a world leading expert in the application of GPU technology to scientific applications since the advent of GPU computing in 2009 and has held numerous awards from NVIDIA over the years and most recently the Nvidia Inception program. He had previously held the prestigious EU H2020 Marie Curie individual fellowship which was featured in the EU report due to the excellence of results and currently serves as a panel member for the EPSRC Exascale program. His current research focuses on Digital twins for the mining industry combining physics based simulations of granular materials to train AI models along with plant and process data along with applying GPU computing and AI methods to problems in High Energy Physics.

COURSE: **“CUDA/C++ GPU Course for AI/ML and Digital Twins”**

DATE ▪ **19 November 2021**

TIME ▪ **10:00 – 13:00**

VENUE ▪ **Tungsten Room** (6th Floor), **Johannesburg Business School** (JBS),
Corner Barry Hertzog and Empire Roads, Milpark, Johannesburg, 2092

REGISTRATION LINK

<https://cern.zoom.us/meeting/register/u5UodOmpzIsGdavGOP7IJJ94Z5zUdC17i2D>

ABSTRACT ▪ This is a CUDA course that is focused on GPU coding and leads into heterogenous, mixed CPU-GPU coding. With previous coding experience, it allows a good student to begin porting applications to the GPU.

ADDITIONAL COURSE PRESENTERS

Prof Daniel Wilke (*University of Pretoria*), and **Prof Simon Connell** (*PSI Group*).

Prof Wilke is an Associate Professor at the University of Pretoria. He is the elected President of the South African Association for Theoretical and Applied Mechanics and the International Association for Computational Mechanics (IACM). His research focuses on data-driven and physics-based generative modelling.

Prof Connell is a Professor of Physics at the University of Johannesburg within the Engineering Faculty. He is a past president of the South African Institute of Physics and founding member of the South African participation in High Energy Physics at the ATLAS Experiment at CERN. Prof Connell has research interests in Particle Physics, Nuclear Physics, Nuclear Energy, Materials Science, Quantum Physics, High Performance Computing and Applied (innovation) Physics.

PRESENTATION: **“Towards Digital Twins of industrial devices using GPU based physics simulations”**

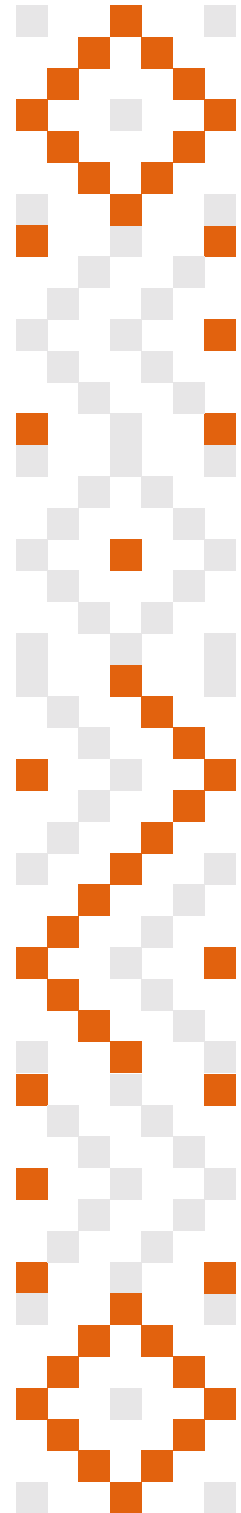
TIME ▪ **13:00 – 14:00**

VENUE ▪ **Tungsten Room** (6th Floor), **Johannesburg Business School** (JBS),
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REGISTRATION LINK

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ABSTRACT ▪ This presentation will be focused on the building of physics based digital twins for mining and industrial processes of granular materials. In particular the development of a high fidelity solver for the training of AI based models using the Discrete Element Method (DEM) and GPU accelerated computing that enables detail such as particle shape (polyhedra) and full scale domains to be captured. The second part of the talk will be focused on the application of machine learning to the data generated from the physics based solver.



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