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| **Department** | Decision Sciences | | |
| **Discipline** | Operations Research and/or Quantitative Management | | |
| **Research Focus Area** | Financial Modelling | | |
| **Total Capacity for 2025** | 24 (14 Masters and 10 PhDs) | | |
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| **Supervision Team** | **Academic Profile** | | **Capacity** |
| Under normal circumstances and at the time of writing the following staff members are available and have the expertise to supervise topics in this focus area. | | | |
| Prof HP Mashele  [[1]](#footnote-1)**(Contact person for this focus area)**  Email: [mashehp@unisa.ac.za](mailto:mashehp@unisa.ac.za) | **Highest qualification**: PhD in Mathematics (Wits).  **Research interests:** Computational Mathematics; Financial Risk Analysis; Financial Engineering.  **NRF-rated researcher (C2).** | Master’s: Up to 3  Doctorates: Up to 2  Post-doctoral fellows: Up to 1 | |
| Professor Petrus H Potgieter Email: [Potgiph@unisa.ac.za](mailto:Potgiph@unisa.ac.za) | **Highest qualification**: PhD in Mathematics (UNISA).  **Research interests:** Unconventional. computation | Master’s: Up to 1  Doctorates: Up to 1 | |
| Prof Kerstin H Jordaan  Email: [jordakh@unisa.ac.za](mailto:jordakh@unisa.ac.za) | **Highest qualification:** PhDin Mathematics (Wits).  **Research interests:** Financial Mathematics, Mathematical Analysis, Approximation Theory.  **NRF-rated researcher (B3).** | Master’s: Up to 1  Doctorates: Up to 1 | |
| Professor MP Mulaudzi Email: [Mulaump@unisa.ac.za](mailto:Mulaump@unisa.ac.za) | **Highest qualification:** PhD in Applied Mathematics (NWU).  **Research interests:** Stochastic Control and Optimisation in Banking and Finance, Sustainable Finance, Reinforcement Learning in Mathematical Finance, Stochastic Processes. | Master’s: Up to 4  Doctorates: Up to 1 | |
| Professor Safari Mukeru Email: [Mukers@unisa.ac.za](mailto:Mukers@unisa.ac.za) | **Highest qualification:** PhD in Operations Research (Unisa).  **Research interests:** Stochastic Processes and applications in Finance.  **NRF-rated researcher** **(C3).** | Master’s: Up to 3  Doctorates: Up to 3 | |
| Dr MM MpandaEmail: [mpandmm@unisa.ac.za](mailto:mpandmm@unisa.ac.za) | **Highest qualification:** PhD in Operations Research (UNISA).  **Research interests:**  Stochastic volatility modelling,  Robust portfolio optimisation and  Financial Machine Learning | Master’s: Up to 2  Doctorates: Up to 1 | |
| **Model of Supervision** | Candidates will be allocated to a supervisor but will be required to work independently within the requirements of higher degree studies. | | |
| **Selection Criteria:**  **MSc, MCom and PhD** | Refer to the qualification website for selection criteria. | | |
| **Selection Procedure** | Refer to the qualification website for selection procedure. | | |
| **Research Scope** | In Decision Sciences the focus at Master's and PhD level is the application of existing advanced mathematical techniques to a new and demanding problem or the further development of such techniques, algorithms or mathematical theory relevant to the practice of Operations Research and/or Quantitative Management. | | |
| **Reading:**  **Subject Field** | 1. Tomas Bjork. Arbitrage Theory in Continuous Time. Oxford University Press, 2004. 2. Y.K. Kwok. Mathematical Models of Financial Derivatives. Springer. 1998. 3. Anything about Stochastic Differential Equations, Stochastic Control and Optimization, The Economics of Money, Banking and Financial Markets. | | |
| **Reading:**  **Research Methodology** | * Departmental Honours project study material. | | |
| **Resources: Scholar Community** | N/A | | |
| **Potential M&D Research Focus** | | | |
| **Unit of Analysis** | **Research Focus** | | |
|  | We work on the pricing of financial products, extraction of information from derivatives pricing, modelling and optimization of the banking activities. Recent papers  1. N. Umeorah, P. Mashele & M. Ehrhardt. 2021. Pricing basket default swaps using quasi-analytic techniques, *Decisions in Economics and Finance,* 44, pp. 241–267. 2. M.B. Seitshiro & H.P. Mashele. 2020. Valuation of initial margin using bootstrap method. *Journal of Risk Finance*, 21 (5), pp. 543-557. 3. M. Seitshiro & H.P. Mashele. 2020. Assessment of model risk due to the use of an inappropriate parameter estimator. *Cogent Economics & Finance*, 8: 1710970. <https://doi.org/10.1080/23322039.2019.1710970> | | |

1. Please note that consulting the research focus area leader is no assurance that your application will be approved. If, however, your application is approved, it is also not a guarantee that he/she will be allocated as your supervisor. [↑](#footnote-ref-1)