



Neill Jurgens Goosen

PhD (Chemical Engineering)

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PERSONAL PROFILE

I am a dynamic and dedicated individual with the vision of becoming a leading researcher in the interdisciplinary field of Bioprocess Engineering. My main research follows the approach of 'biorefinery' and 'zero-waste', and current projects are focussed on optimal and sustainable utilisation of biological feedstocks, valorisation of waste and by-products and the integration of renewable energy solutions into existing industries and smallholder farming systems. As an academic, I strive to deliver excellence in both my research and teaching in order to add long-term value to my organisation.

EDUCATION

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| 2014 | PhD (Chemical Engineering), Stellenbosch University. Dissertation title: "Investigation of potential bio-active properties and effects on production performance of aquafeed ingredients derived from fish processing waste by way of enzymatic autolysis" |
| 2007 | MSc. Eng. (Chemical Engineering), Stellenbosch University |
| 2005 | B.Eng. (Chemical Engineering), Stellenbosch University |

EMPLOYMENT HISTORY

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| Jan 2020 - present | Director: ARUA Centre of Excellence in Energy
Overseeing strategic direction of the CoE, engaging funders, research collaborators and other stakeholders, securing external funding. |
| Jan 2013 – 2019 | Senior Lecturer, Department of Process Engineering, Stellenbosch University
Preparation and presentation of lectures and assessments, administration of modules, supervision of final year undergraduate and postgraduate students, production of scholarly works, contributing to Departmental marketing and outreach activities, securing public and industrial research funds. |
| March 2008 – Oct. 2009: | Process Engineer, GBM Minerals Engineering Consultants, London, United Kingdom
Metallurgical process development, review of metallurgical test results, setting up and reconciliation of mass balances, coordinating development and drafting of Process Flow Diagrams (PFDs) and Piping and Instrumentation Diagrams (PIDs), assisting with equipment selection and procurement, managing of equipment lists, assisted with project document control. |

AWARDS

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| 2014 | Awarded the 'Carolina MacGillavry - IFS Collaborative Research Award' for the top research proposal for the 2013 IFS call for Collaborative Research. http://www.ifs.se/ifs-grantees/ifs- |
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2017 Faculty of Engineering: Upcoming Researcher of the year, Stellenbosch University

TEACHING

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- 2013 - present **Undergraduate:** various modules in the Engineering programme, including Engineering Chemistry (general 1st year module for all Engineering disciplines, with class sizes up to 250), Fluid Mechanics (2nd year Chem. Eng. students), Report Writing and Laboratory (2nd year Chem. Eng. students), Undergraduate Research Project and Final Year Design (both for final year Chem. Eng. students).
- 2013 - present **Postgraduate:** Supervision and co-supervision of Masters and PhD students in various topics related to Bioprocess Engineering.

RESEARCH PROJECTS

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- 2014 - 2016 **Thuthuka Grant TTK13070520623 – 3 year project (finalised):** “Production of value added products through controlled protein hydrolysis of fish processing waste” (ZAR 480,846.00)
- 2014 - 2017 **Protein Research Foundation – 4 year project (finalised):** “Increasing South African protein production through the development of value-added products for fish processing waste” (ZAR 271,098.00)
- 2015 - 2016 **International Foundation for Science – 2 year project (finalised):** “Determining suitability of Ximenia fruit pomace for value-added antioxidant extraction” (US\$ 15,446.00)
- 2015 – 2016 **Industry sponsored – 2 year project (finalised):** “Optimization of enzymatic production of value-added products from fish processing by-products” (ZAR 667,262.00)
- 2016 - 2018 **Research and Technology Fund RTF150317115343 – 3 year project (finalised):** “Development of emulsions as enzyme carriers in aquaculture feeds” (ZAR 599,922.00)
- 2016 - 2018 **Research and Technology Fund RTF150417117319 – 3 year project (finalised):** “Aquafeeds for use in aquaponics” (ZAR 650,000.00)
- 2017 - 2019 **African Union Collaborative Research Grant 2016 – 3 year project as part of a team of researchers from African and EU countries (ongoing):** “Employing anaerobic biodigestion as method for recycling of agricultural nutrients, and for the valorisation of unutilised agricultural biomass” (Euro 102,123.00)
- 2017 – 2019 **Industry sponsored – 2 year project (ongoing):** “Optimization of enzymatic extraction of plant bio-stimulants from South African seaweed” (ZAR 607,000.00)
- 2018 – 2020 **Industry collaboration – 3 year project (ongoing):** “Development and demonstration of a production processes to manufacture value-added ingredients from South African kelp” (ZAR 12,128,802.00)
- 2019 – 2020 **Industry collaboration – 1 year contract (ongoing):** “Development of enzymatic protein hydrolysis process for production of organic fertilizer” (ZAR 940, 944.00)
- 2019 - 2023 **European H2020 multi-partner project – 4 year project (ongoing):** “New species, processes and products contributing to increased production and improved sustainability in emerging low trophic, and existing low and high trophic aquaculture value chains in the Atlantic” (€100,000.00)

RESEARCH OUTPUTS

Peer reviewed publications: a total of 24 peer reviewed journal articles have thus far been published, with a further 2 currently under review. See complete list in Appendix A.

Conference papers: a total of 25 papers have been presented at national and international conferences and symposia. See complete list in Appendix A.

REFERENCES

Prof. Percy van der Gryp

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APPENDIX A: Research record

Peer reviewed journal publications

1. **Goosen, N.J.**, Görgens, J.F., De Wet, L.F., Chenia, H., 2011, Organic acids as potential growth promoters in the South African abalone *Haliotis midae*, *Aquaculture*, 321, pp 245–251. <https://doi.org/10.1016/j.aquaculture.2011.09.019>
2. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., Jacobs, K., De Bruyn, A., 2014. Fish silage oil from rainbow trout processing waste as alternative to conventional fish oil in formulated diets for Mozambique tilapia *Oreochromis mossambicus*. *Animal Feed Science and Technology*. 188, 74 - 84. <https://doi.org/10.1016/j.anifeedsci.2013.10.019>
3. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2014. The effects of protein hydrolysates on the immunity and growth of the abalone *Haliotis midae*. *Aquaculture* 428-429C, pp. 243-248. <https://doi.org/10.1016/j.aquaculture.2014.03.018>
4. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2014. Rainbow trout silage oil as immunity enhancing feed ingredient in formulated diets for South African abalone *Haliotis midae*. *Aquaculture* 430, pp 28 – 33. <https://doi.org/10.1016/j.aquaculture.2014.03.040>
5. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2015. Comparison of hydrolysed proteins from different raw materials in diets for Mozambique tilapia *Oreochromis mossambicus*, *Aquaculture International* 23, pp 1165 – 1178. <https://doi.org/10.1007/s10499-014-9873-4>
6. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2016. Rainbow trout silage as immune stimulant and feed ingredient in diets for Mozambique tilapia (*Oreochromis mossambicus*). *Aquaculture Research*, 47, 329–340. <https://doi.org/10.1111/are.12497>
7. Pott, R.W.M., Wolff, K.E., **Goosen, N.J.**, 2017. Using an informal competitive practical to stimulate links between the theoretical and practical in fluid mechanics: a case study in non-assessment driven learning approaches. *Education for Chemical Engineers*, 21, 1-10. <https://doi.org/10.1016/j.ece.2017.08.001>
8. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2018. Effects of formic acid in abalone diets that contain ingredients derived from fish processing by-products. *Aquaculture International*, 26(3), 857 - 868. <https://doi.org/10.1007/s10499-018-0257-z>
9. Swanepoel, J.C., **Goosen, N.J.**, 2018. Evaluation of fish protein hydrolysates in juvenile African catfish (*Clarias gariepinus*) diets. *Aquaculture* 496, 262 – 269. <https://doi.org/10.1016/j.aquaculture.2018.06.084>
10. Mokomele, T., da Costa Sousa, L., Bals, B., Balan, V., **Goosen, N.**, Dale, B., Görgens, J., 2018. Using steam explosion or AFEX™ to produce animal feeds and biofuel feedstocks in a biorefinery based on sugarcane residues. *Biofuels, Bioproducts & Biorefining* 12(6), 978 - 996. <https://doi.org/10.1002/bbb.1927>
11. Oosthuizen, D., **Goosen, N.J.**, Stander, M.A., Ibrahim, A.D., Pedavoah, M.M., Usman, G.O., Aderinola, T., 2018. Solvent extraction of polyphenolics from the indigenous African fruit *Ximenia caffra* and characterization by LC-HRMS. *Antioxidants*, 7(8), 103. <https://doi.org/10.3390/antiox7080103>
12. **Goosen, N.J.**, Oosthuizen, D., Stander, M.A., Ibrahim, A.D., Pedavoah, M.M., Usman, G.O., 2018. Phenolics, organic acids and minerals in the fruit juice of the indigenous African sourplum (*Ximenia caffra*, Olacaceae). *South African Journal of Botany* 119, 11 – 16. <https://doi.org/10.1016/j.sajb.2018.08.008>
13. Swart, J., Bordoloi, A., **Goosen, N.J.**, 2019. Optimization of phosphate recovery from monkfish *Lophius vomerinus* processing by-products and characterization of the phosphate phases. *Journal of the Science of Food and Agriculture* 99(6), 2743 - 2756. <https://doi.org/10.1002/jsfa.9450>
14. Breckwoldt, N., **Goosen, N.**, Van der Gryp, P., Smith, G., 2019. Hydroformylation of the post-metathesis product 7-tetradecene using rhodium(I) Schiff base derived precatalysts. *Applied Catalysis A: General* 573, 49 - 55. <https://doi.org/10.1016/j.apcata.2019.01.008>
15. Breckwoldt, N.C.C., **Goosen, N.J.**, Van der Gryp, P., Vosloo, H.C.M., 2019. Kinetic evaluation of the hydroformylation of the post-metathesis product 7-tetradecene using bulky phosphite-modified rhodium catalyst. *Reaction Chemistry & Engineering* 4, 695 – 704. <https://doi.org/10.1039/C8RE00239H>

16. Oké, V., **Goosen, N.J.**, 2019. The effect of stocking density on profitability of African catfish (*Clarias gariepinus*) culture in extensive pond systems. *Aquaculture* 507, 385 - 392. <https://doi.org/10.1016/j.aquaculture.2019.04.043>
17. Breckwoldt, N.C.C., **Goosen, N.J.**, Van der Gryp, P., Smith, G., 2019. Kinetic evaluation of the hydroformylation of the post-metathesis product 7-tetradecene using a heterobimetallic rhodium-ferrocenyl Schiff base derived precatalyst. *Reaction Kinetics, Mechanisms and Catalysis* 128(1), 333 – 347. <https://doi.org/10.1007/s11144-019-01628-3>
18. Siangwata, S., Breckwoldt, N.C.C., **Goosen, N.J.**, Smith, G., 2019. Olefin hydroformylation and kinetic studies using mono- and trinuclear N,O-chelate rhodium(I)-aryl ether precatalysts. *Applied Catalysis A: General* 585, <https://doi.org/10.1016/j.apcata.2019.117179>
19. Woods, M.J., **Goosen, N.J.**, Hoffman, L.C., Pieterse, E., 2020. A simple and rapid protocol for measuring the chitin content of *Hermetia illucens* (L.) (Diptera: Stratiomyidae) larvae, *Journal of Insects as Food and Feed*. <https://doi.org/10.3920/JIFF2019.0030>
20. Oosthuizen, D., **Goosen, N.J.**, Hess, S., 2020. Solar thermal process heat in fishmeal production: prospects for two South African fishmeal factories. *Journal of Cleaner Production* 253. <https://doi.org/10.1016/j.jclepro.2019.119818>
21. Bordoloi, A., **Goosen, N.J.**, 2020. A greener alternative using subcritical water extraction to valorize the brown macroalgae *Ecklonia maxima* for bioactive compounds. *Journal of Applied Phycology* (accepted). <https://doi.org/10.1007/s10811-020-02043-1>
22. Siqwepu, O., Salie, K., **Goosen, N.**, 2020. Evaluation of chelated iron and iron sulphate in the diet of African catfish *Clarias gariepinus* to enhance iron excretion for application in integrated aquaponics systems (accepted). *Journal of the World Aquaculture Society*. <https://doi.org/10.1111/jwas.12697>
23. Greyling, N., Bordoloi, A., **Goosen, N.J.**, 2020. Optimizing enzymatic conditions of monkfish (*Lophius vomerinus*) heads hydrolysis towards potential waste biomass valorization (accepted). *Biomass Conversion and Biorefinery*. <https://doi.org/10.1007/s13399-020-00650-z>
24. Siqwepu, O., Salie, K., **Goosen, N.**, 2020. Evaluation of potassium diformate and potassium chloride in the diet of the African catfish, *Clarias gariepinus* in a recirculating aquaculture system (accepted). *Aquaculture* <https://doi.org/10.1016/j.aquaculture.2020.735414>

Books and book chapters

1. Robaina , L., Pirhonen, J., Mente, E., Sánchez, J., **Goosen, N.**, 2019. Chapter 13: Fish diets in aquaponics, in: Goddek, S., Joyce, S., Kotzen, B., Burnell, G. (Eds.), *Aquaponics food production systems*. Springer International Publishing.
2. Bordoloi, A., Goosen, N., 2020. Green and integrated processing approaches for the recovery of high-value compounds from brown seaweeds, in: Bourgoignon, N. (Ed), *Advances in Botanical Research, Volume 95, 369 - 413: Seaweeds Around the World: State of Art and Perspectives*, 1st Edition. Academic Press, Elsevier. <https://doi.org/10.1016/bs.abr.2019.11.011>

Conference publications

1. **Goosen, N.J.**, Görgens, J.F., De Wet, L.F., Chenia, H., 2007, Organic acids as potential growth promoters in the South African abalone, (Oral presentation) AASA Conference, Cape Town, South Africa
2. **Goosen, N.J.**, Görgens, J.F., De Wet, L.F., Chenia, H., 2008, Organic acids as potential growth promoters in the South African abalone, (Oral presentation) XIII ISFNF – 13th International Symposium on Fish Nutrition and Feeding, Florianopolis, Brazil
3. De Wet, L.F., **Goosen, N.J.**, French, J., 2012, Application of acidifying agents in artificial diets for South African abalone, *Haliotis midae*, (Oral presentation) 8th International Abalone Symposium, Hobart, Australia
4. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2012. Improving the sustainability of Tilapia aquaculture through the utilisation of fish oil recovered from fish silage as aquafeed ingredient, Poster presentation XV ISFNF - 15th International Symposium on Fish Nutrition and Feeding, Molde, Norway

5. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2012. Improving the sustainability of Tilapia aquaculture by using fish silage as feed ingredient in formulated diets. Poster presentation, XV ISFNF - 15th International Symposium on Fish Nutrition and Feeding, Molde, Norway
6. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2013. Hydrolysed proteins in feeds for Mozambique tilapia. Bi-annual conference of the Aquaculture Association of Southern Africa, Stellenbosch, South Africa.
7. Jeney, Z., Ardò, L., **Goosen, N.**, De Wet, L., Feledi, T., Rònyai, A., Jeney, G., 2013. Effect of transportation stress on Barramundi (*Lates calcarifer*) fed with diets containing *Astragalus membranaceus* and rooibos (*Asphalathus linearis*). Bi-annual conference of the Aquaculture Association of Southern Africa, Stellenbosch, South Africa.
8. Jeney, G., Ardò, L., **Goosen, N.**, De Wet, L., Feledi, T., Rònyai, A., Jeney, Z., 2013 Immunostimulating effects of *Astragalus* (*Astragalus membranaceus*) and rooibos (*Asphalathus linearis*) in Asian seabass (*Lates calcarifer*). Bi-annual conference of the Aquaculture Association of Southern Africa, Stellenbosch, South Africa.
9. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2014. Oil recovered from fish silage in formulated diets for South African abalone *Haliotis midae*, Oral presentation, XVI ISFNF - 16th International Symposium on Fish Nutrition and Feeding, Cairns, Australia
10. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2015. The effects of protein hydrolysates fed under two different feeding regimes on the immunity and growth of the South African abalone *Haliotis midae*, Oral presentation, World Aquaculture 2015, Jeju Island, South Korea
11. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2015. Fish processing waste: The underutilized resource. Oral presentation, Bi-annual conference of the Aquaculture Association of Southern Africa, Polokwane, South Africa.
12. **Goosen, N.J.**, Lubbe, D., 2017. Influence of particle size and alkaline pretreatment on ethanol extraction of polyphenolics from dried marine macroalgae *Durvillaea potatorum*, Poster presentation, International Conference on Algal Biomass, Biofuels and Bioproducts, Miami, USA.
13. **Goosen, N.J.**, De Wet, L.F., Görgens, J.F., 2017. The use of dietary ingredients derived from fish processing by-products in abalone diets, with and without formic acid supplementation, Oral presentation, World Aquaculture 2017, Cape Town, South Africa.
14. Siqwepu, O., Salie, K., **Goosen, N.J.**, 2017. Optimization of nutrient input to integrated aquaponics systems through mineral supplementation by way of fish feed additives. Oral presentation, World Aquaculture 2017, Cape Town, South Africa.
15. Swanepoel, J.C., **Goosen, N.J.**, 2017. Determining the bioavailability of phosphate feed additives with African catfish *Clarias gariepinus*. Oral presentation, World Aquaculture 2017, Cape Town, South Africa.
16. Malherbe, C., De Wet, L.F., Stander, H., **Goosen N.J.**, 2017. Evaluation of rainbow trout *Oncorhynchus mykiss* viscera silage for use as foliar fertilizer in aquaponic production. Poster presentation, World Aquaculture 2017, Cape Town, South Africa.
17. Gericke, S., Salie, K., **Goosen, N.J.**, De Wet, L.F., 2017. Post-extrusion application of emulsified endo-1,4-beta-xylanase in diets of African catfish *Clarias gariepinus*. Poster presentation, World Aquaculture 2017, Cape Town, South Africa.
18. Pott, R., Wolff, K., **Goosen, N.**, 2017. Using the semantic wave to improve learning in fluid mechanics. Oral presentation. Legitimation Code Theory Conference, Sydney, Australia.
19. Tadie, M., Pott, R., Wolff, K., **Goosen, N.**, Van Wyk, P., 2017. Implementation of a unit conversion and estimation competency test for first-year Engineering students. 10th Annual Conference on the Scholarship of Teaching and Learning, Stellenbosch University
20. Swanepoel, J.C., **Goosen, N.J.**, 2017. Determining the bioavailability of enzymatically hydrolysed fish protein with African catfish *Clarias gariepinus*. Oral presentation, Aquaculture Europe, Dubrovnik, Croatia.
21. Tadie, M., Pott, R., Wolff, K., **Goosen, N.**, Van Wyk, P., 2018. Expanding 1st year problem solving skills through unit conversions and estimations. EDUCON 2018, Santa Cruz de Tenerife, Canary Islands, Spain.

22. Siqwepu, O., Salie, K., **Goosen, N.**, 2018. Optimization of nutrient input to integrated aquaponics systems through mineral supplementation by way of potassium feed additives. Oral presentation, World Aquaculture, Montpellier, France.
23. Bordoloi, A., **Goosen, N.J.**, 2019. Green extraction of sulphated polysaccharides and alginate from the South African kelp *Ecklonia maxima*, by subcritical water hydrolysis. Oral presentation, 23rd International Seaweed Symposium, Jeju Island, Republic of Korea.
24. Bordoloi, A., **Goosen, N.J.**, 2019. Subcritical water extraction for recovering high value products from the brown macroalgae *Ecklonia maxima*: A greener alternative. Poster presentation, 9th International conference on Algal Biomass, Biofuels and Bioproducts, Boulder, Colorado, USA.
25. Woods, M.J., Hoffman, L.C., Pieterse, E., **Goosen, N.J.**, 2019. Enzymatic fractionation of protein, fat and chitin from *Hermetia illucens* (L.) (Diptera: Stratiomyidae). Oral presentation, 3rd International Tropical Agriculture Conference (TROPAG 2019), Brisbane, Australia.

Theses and dissertations

- Goosen, N.J.**, 2014, Investigation of potential bio-active properties and effects on production performance of aquafeed ingredients derived from fish processing waste by way of enzymatic autolysis, University of Stellenbosch, Department of Process Engineering (PhD dissertation).
- Goosen, N.J.**, 2007, Organic acids as growth promoters in the South African abalone, *Haliotis midae*, University of Stellenbosch Department of Process Engineering (MSc. Eng. thesis).

Articles in popular publications

1. **Goosen, N.J.**, 2018, Alternative feed ingredients for aquafeeds, Aquaculture Africa Magazine, Vol 1 (2), pp 24.

APPENDIX B

Postgraduate students supervised

Masters students

1. Greyling, N. Optimisation of enzymatic hydrolysis of monkfish heads for preparing protein hydrolysates as animal feed ingredient (Main supervisor, M.Eng., March 2017)
2. Swart, J. Establishing processes in producing dicalcium phosphate, octacalcium phosphate and gelatin from monkfish (*Lophius vomerinus*) bones (Main supervisor, M.Eng., March 2017)
3. Ndlovu, W. Optimisation of the enzymatic hydrolysis of rainbow trout processing by-products to manufacture liquid fertiliser (December 2017, M.Eng., Main supervisor)
4. Swanepoel, J.C. Determination of bioavailability and bioactivity of enzymatically hydrolysed fish protein and phosphates in the African catfish *Clarias gariepinus* (December 2017, M.Eng., Main supervisor)
5. Visser, C. Kinetic and economic potential evaluation of Grubbs-based catalysts for 1-octene metathesis (Co-supervisor, M.Eng., December 2017)
6. Oosthuizen, D. Opportunities for solar process heat integration and heat recovery in the South African fish meal industry (Main supervisor, M.Eng., March 2018)
7. Khetni, M. Design, construction and evaluation of a vacuum evaporation system for the concentration of aqueous whey protein solutions (Main supervisor, M.Eng., March 2018)
8. Seleme, R.N., Microcalorimetry and population balance modeling of enzymatic protein hydrolysis (Co-supervisor, M.Eng., March 2019)
9. Gericke, S.J., Effects of xylanase and arabinoxylan-oligosaccharide on the growth performance, non-specific immunity and intestinal microbial diversity of African catfish, *Clarias gariepinus* (Co supervisor, M.Sc., Animal Science, March 2019)
10. Du Toit, L. Triticale grain as feedstock for co-production of bio-ethanol and animal feed (Co supervisor, M.Eng., March 2019)
11. Claase, A., Optimisation of enzymatic hydrolysis for solubilisation of the marine macroalgae *Ecklonia maxima* (Main supervisor, December 2019)
12. Pretorius, R. Design and modeling of an experimental tilapia and African catfish recirculating aquaculture system (Main supervisor, March 2020)
13. Mapholi, Z., Optimization of fucoïdan recovery by ultrasound assisted enzymatic extraction from South African kelp, *Ecklonia maxima* (Main supervisor, March 2020)
14. Van Breda, D.J. Enzymatic extraction of laminarin from brown seaweed *Ecklonia maxima* (Main supervisor, March 2020)

PhD students

1. Breckwoldt, N.C.C., Hydroformylation of post-metathesis alkenes using rhodium-based catalysts (Main supervisor, December 2019)
2. Woods, M.J., Colouring the grey areas of insect mass-production to solidify their use as feed, food and biological control agents (Co-supervisor, December 2019)
3. Siangwata, S., Monometallic and multimetallic complexes as precatalysts in the hydroformylation of olefins (Co-supervisor, expected March 2020)
4. Guwa, O., Optimization of nutrient input to integrated aquaponics systems through mineral supplementation by way of fish feed additives (Main supervisor, Expected December 2020)

