



University of Pretoria Yearbook 2022

Environmental nanomaterials 732 (CKO 732)

Qualification	Postgraduate
Faculty	Faculty of Engineering, Built Environment and Information Technology
Module credits	32.00
NQF Level	08
Programmes	BEngHons Chemical Engineering
Prerequisites	Admission to relevant programme.
Contact time	32 contact hours per semester
Language of tuition	Module is presented in English
Department	Chemical Engineering
Period of presentation	Semester 2

Module content

Introduction to nanotechnology, industrial production of nanomaterials, physico-chemical properties of nanomaterials, identification of nanomaterials sources (point vs diffuse sources) to aquatic systems. Fate, behaviour and transport of nanomaterials in different environmental media (freshwater, sediments, wastewater, and soil). Fractal theory and transformation pathways of nanomaterials: chemical, biological, physical and interactions with macromolecules transformations. Nanoecotoxicology: concept of toxicity within nanomaterials regime, nanomaterials toxicity tests (acute vs. chronic toxicity), mechanisms of nanomaterials toxicity, biocompatibility of nanomaterials, bioaccumulation and persistence. Risk assessment paradigm: Hazard identification (production volumes, material flows, nanowastes generation, bioaccumulation, long-range transport, and persistence), hazard characterization (in vitro vs. in vivo studies, adverse outcome pathways), exposure assessment (life cycle assessment and environmental uptake), risk assessment, and risk management (regulation, nanowastes and by-products management protocols). Sustainable nanotechnology paradigm: safe-by-design concept, risk modelling and predictions.

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