

**Programme:** M.Sc. (Marine Sciences)

**Course Code:** MSO 367

**Title of the Course:** Bioaccumulation and Phytoremediation

**Number of Credits:** 03

**Effective from AY:** June 2018-19

<b>Prerequisites for the course</b>	Students undergoing course in any branch of Marine Sciences.	
<b>Objective</b>	This course introduces concept of bioaccumulation of metals and remediation of metal pollution by mangroves.	
<b>Content</b>	<p>Metal sources to marine environment - natural - anthropogenic - metal retention in sediments -role of grain size - organic matter - Fe-Mn oxides - sulphides - Definition and significance of metal speciation - forms of metals - bioavailable - residual - bioavailability of metals -definition - driving factors for desorption of metals from the bioavailable fraction of the sediments - ionic composition – pH – Eh - organic matter degradation – metal toxicity assessment – SQUIRT - RAC.</p> <p>Bioaccumulation of metals – definition - metal accumulation in benthic biota - Arsenic bioaccumulation in biota of the Sundarban Mangrove Wetland – a case study - Bioaccumulation factor (BAF) - concept of Bioconcentration – Bioconcentration factor (BCA) - harmful effects of bioaccumulation of metals on biota - Biomagnification in trophic levels – risk to human health.</p> <p>Metal accumulation in mangroves – pneumatophores – leaves - stem - remediation of metal contamination – phytoremediation – application of mangrove species - Translocation factor (TF) - techniques of phytoremediation – Phytoextraction – Rizofiltration – phytovolatilization - phytostabilization, phytodegradation - Rhizodegradation/Phytostimulation - Advantages and disadvantages of Phytoremediation.</p>	<p>12 hours</p> <p>12 hours</p> <p>12 hours</p>
<b>Pedagogy</b>	Lectures / Assignments / Seminars / Discussion	
<b>References / Readings</b>	<ol style="list-style-type: none"><li>1. Trace metals in a tropical mangrove wetland, 2018 Sarkar, S. K., Springer Nature Singapore Pte Ltd.</li><li>2. Trace elements in terrestrial environments, 2001 Adriano, D.C., Springer Science+Business Media, LLC.</li><li>3. Bioaccumulation in marine organisms, 2002 Neff, J. M., Elsevier Ltd.</li><li>4. The biology of mangroves and seagrasses, 2015 Hogarth P. J., Oxford University press.</li><li>5. Sequential extraction procedure for the speciation of particulate trace metals, 1979 Tessier, A., Campbell, P. G. C. and Bisson, M., Analytical Chemistry, American Chemical Society.</li></ol>	
<b>Learning Outcomes</b>	<ol style="list-style-type: none"><li>1. Understanding of accumulation of metals by biota and mangroves.</li><li>2. Knowledge of application of mangroves in remediation of metal pollution.</li></ol>	