National Institute of Technology Rourkela

## Registration Seminar

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| Seminar Title | : Bioprospecting of marine microbial secondary metabolites and biopolymer-based composite for cancer therapy and environmental applications |
| Speaker | : Poojarani Panda ( Rollno : 523ls6008) |
| Supervisor | : Surajit Das |
| Venue | : Life Science Meeting Room |
| Date and Time | : 01 Aug 2025 (04.00 PM) |
| Abstract | : Marine microorganisms are known to synthesize a diverse range of bioactive compounds with significant bioprospecting potential, including antibacterial and anticancer properties. Their unique biochemical pathways and adaptive mechanisms to extreme environmental conditions enable the production of structurally and functionally novel metabolites. This study aims to extract, characterize, and evaluate bioactive compounds for their ability to induce apoptosis and autophagy in oral squamous cell carcinoma (OSCC) cells. Additionally, polymer-based composite will be developed for sustained drug release and removing heavy metals, offering insights into their role in bioremediation. Microbial strains, including bacteria, actinobacteria, and fungi, were isolated from collected samples from Chilika Lake of Odisha and screened for antimicrobial activity. Selected strains were cultured under optimized conditions to enhance metabolite production, followed by extraction using ethyl acetate. ATR-FTIR and $^{1}H$ NMR spectroscopy of crude extracts revealed the presence of various functional groups and chemically diverse bioactive compounds. The crude extracts showed dose-dependent cytotoxicity on oral squamous carcinoma cells, with *Streptomyces albidoflavus* CSEA02-derived extracts exhibiting $IC_{50}$ values as low as 0.25 mg/mL. GC-MS analysis of *Streptomyces albidoflavus* CSEA02 extract identified many bioactive compounds, with Pyrrolo[1,2-a] pyrazine-1,4-dione, hexahydro-3-(2-methylpropyl) (PPDHMP) as the highest peak. The compound showed cytotoxicity against oral squamous carcinoma cells, and also significantly inhibited FaDu cell proliferation, reduced colony formation, and increased caspase-3/7 activity. Additionally, *Streptomyces albidoflavus* CSEA02 formed maximum biofilm at 72 hours, and EPS production was highest at pH 5 and 30°C, with a major carbohydrate content of 151.20 ±&thinsp1.44 mg/g. Structural analysis of the EPS from the *Streptomyces albidoflavus* CSEA02 confirmed the presence of characteristic carbohydrate functional groups. |