



PhD studentship in the SENSUS (Sensing Nutrients for Agronomic Advice and Sustainability Measures) project

Funded by the Irish Department of Agriculture, Food and the Marine

Project Title: Developing & applying handheld optical sensors for spatial & temporal nutrient analysis

We are seeking applicants with a Bachelors/Masters degree (2.1 or higher) in analytical science, environmental science, agricultural science, or similar, preferably with field and laboratory experience (*e.g.* in soil or water sampling, use of spectroscopic techniques such as IR, fluorescence, etc.). A studentship of €18,000 per annum, plus fees costs to a maximum of €6,000 per annum, is available for 4 years. The PhD student will be registered in Dublin City University, supervised by Dr. Blánaid White (DCU) and Dr. Karen Daly (Teagasc) and work as part of the DAFM-funded project, SENSUS - Sensing Nutrients for Agronomic Advice and Sustainability Measures. This project will be primarily based at Teagasc Johnstown Castle, Wexford but registered with DCU (Dublin).

To apply: please send letter of application, outlining suitability for the post, and a CV including the names of 2-3 referees, to Blánaid White, Blanaid.white@dcu.ie, before 28th of May 2021, marking applications DAFM_SENSUS for ref.

Project description: This position will form part of the SENSUS project, funded by the Irish Department of Agriculture, Food and the Marine under their Research Funding programme.

Understanding the behaviour of soils and soil nutrient mobilisation in Irish farming landscapes is critical to protecting water quality in the wider environment. Irish soils are especially heterogeneous, even at small scales, and key to managing soils sustainably is understanding the spatial variability of soils around the farm. Soil spectroscopy has emerged as a useful technique to describe soil quality around the farm by predicting properties such as organic matter, particle size, pH and phosphorus sorption properties. Advances in handheld and portable applications of these techniques at field scale could offer a rapid and cost effective method of providing information on soils to farmers and advisors. A unique feature of Irish farming landscape is the network of open ditches that function as a conduit for nutrients such as phosphorus and nitrogen. Ditch sediment could potentially attenuate or mobilise nutrients depending on the sediment properties, and the application of soil spectroscopy to these features to help unlock their role in nutrient mobilisation.

This Ph.D. will optimise sampling methodologies and develop chemometric models for portable applications in FTIR and XRF, for soil and sediment analysis. The application of handheld FTIR predict multiple soil and sediment properties at smaller spatial scales than current methods allow will advance our understanding of on-farm soil quality and nutrient mobility. Field soil and ditch sediments will Portable XRF will be coupled with passive sampling devices for soils and sediments to provide rapid assessment tools for in situ measurements. The portable techniques developed in this project will be deployed at pilot sites to evaluate their usefulness in farm advisory and risk assessment for soil and water quality protection.