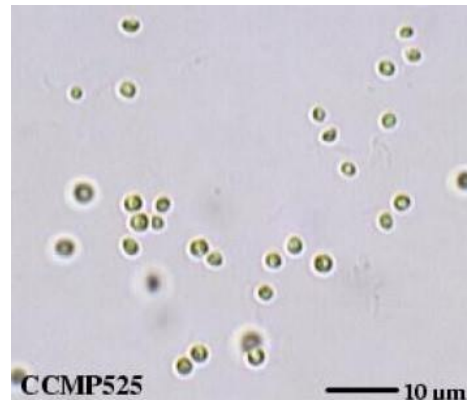
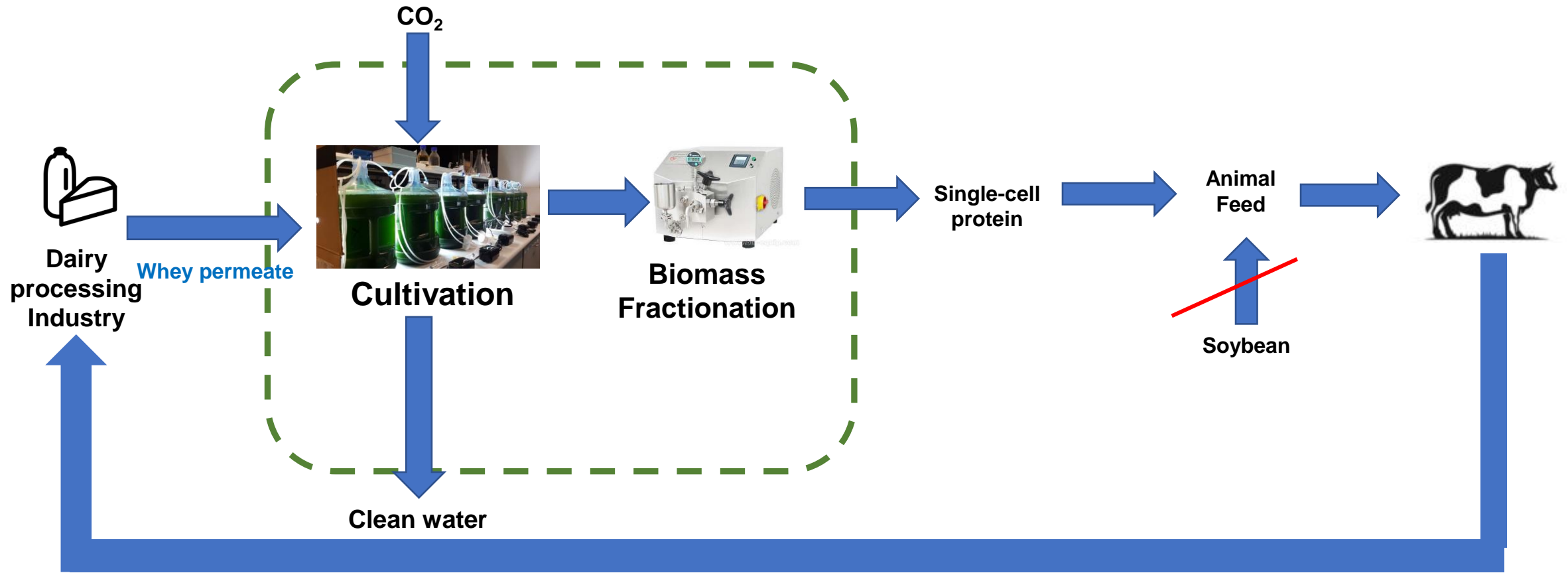


# What is microalgae?



*Nannochloropsis* sp.  
(rich in lipid, protein,  $\omega$ 3 lipid)

# What role can microalgae play in our society?



**Waste valorisation**  
**Carbon capture**  
**Novel food ingredients**

**Sustainable system**  
**Circular bioeconomy**  
**Food security in Ireland**



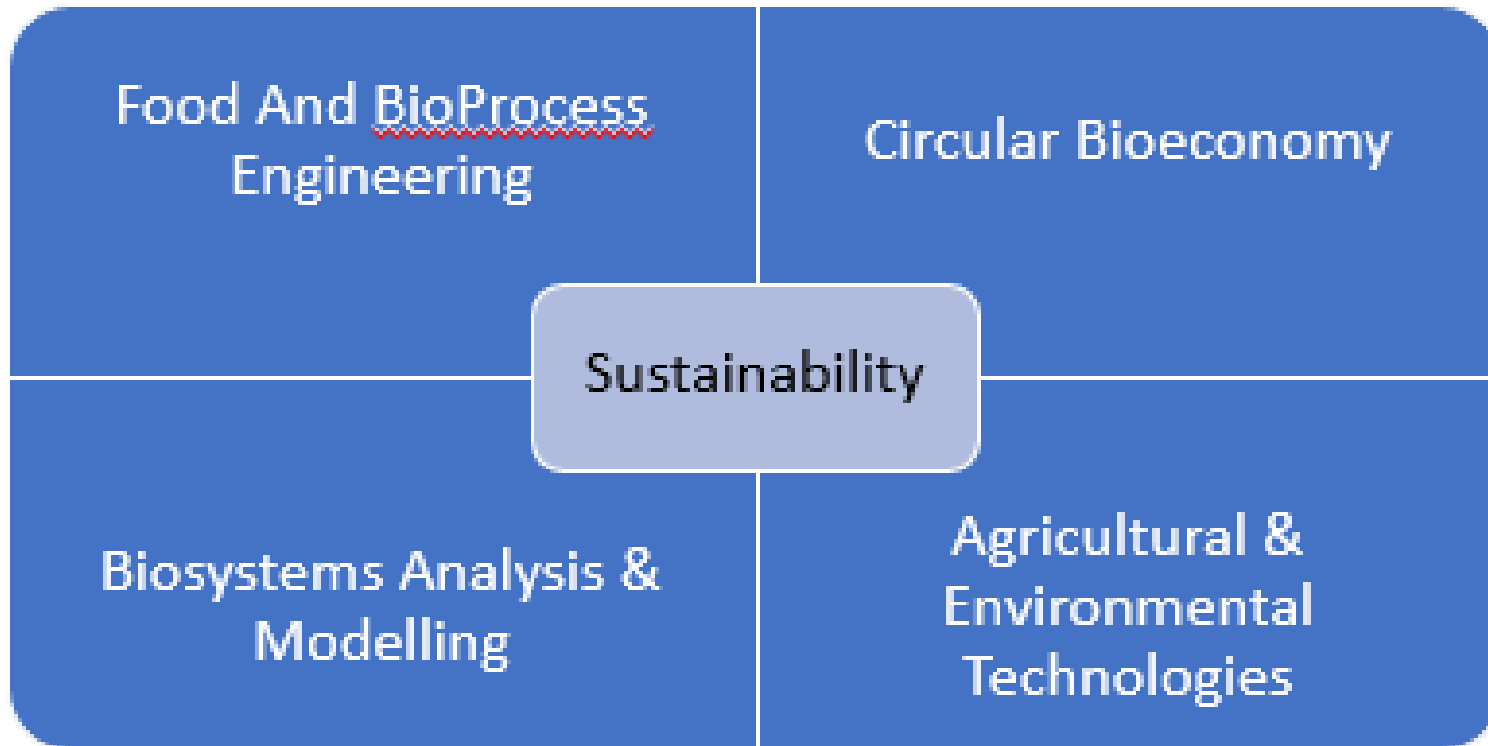
# UCD School of Biosystems & Food Engineering

**Dr. Ronald Halim**  
**Assistant Professor**  
**BE (UNSW), PhD (Monash)**



# School of Biosystems and Food Engineering

A School with Sustainability as its Core Business across Research, Education and Innovation.



# School of Biosystems and Food Engineering

## At a glance:

- **20** Faculty
- 9 Assistant Professors
- 25 Research Staff
- Total of **300** Full-time equivalent students including 67 research/PhD students
- Circa €5 million research funding awarded annually
- Highly Cited Researchers in our academic team: Prof Paula Bourke (our Head of School), Prof Da Wen Sun, Prof Colm O Donnell and Prof Enda Cummins.



# Research Projects in Our School



Sustainable and carbon-neutral farming

Proveye Secures €1 million in Seed Funding



Pictured at NovaUCD are Proveye founders, Jerome O'Connell and Professor Nick Holden, UCD School of Biosystems and Food Engineering.

Remote sensing coupled with AI for sustainable agriculture

# WATSON

A holistic framework with Anticounterfeit and Intelligence-based technologies that will assist food chain stakeholders in rapidly identifying and preventing the spread of fraudulent practices.

# Why should I study ME Biosystems and Food Engineering?

To be at the forefront in the development of scalable and circular solutions for

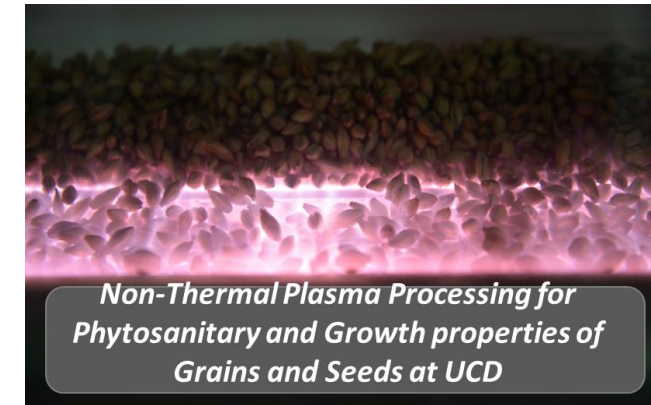
- Sustainable systems engineering e.g biorefinery, bioresource recovery, IOT enabled agrifood systems
- GHG mitigation,
- Waste recycling and valorisation
- Environmental assessments in the agri-food, biomass and bioenergy sectors
- Industry 4.0 in Agriculture

Biosystems and Food Engineering Graduates can find:

- graduate employment opportunities in food and beverage companies, environmental protection and waste recycling companies, and green technology companies.
- full PhD Scholarships in Ireland and the EU.

# Why study in our School?

- **World leading experts** in sustainable food systems, biological and environmental engineering.
- **Extensive Research Infrastructure**
  - in Spectral Imaging and Advanced Process Analytical Technology suites
  - in Non-Thermal Process Technologies suite
  - in Circular Bioeconomy Suite – Biosensors, Bio-Resource Recovery (e.g. Microalgae)
- **Extensive industry network** in Ireland and the EU
- **Plenty of fun activities outside of studying**





# Why Sustainability?

- Sustainability is on the agenda across all sectors.
- All sectors are responding to sustainability goals, with many organisations setting targets to be achieved by 2030 for compliance, consumer or market retention purposes.
- There is a significant demand identified for skills in sustainability; there were 2,392 jobs in Sustainability in Ireland advertised on LinkedIn in January 2023.
- Engineers Ireland – ‘We will embed sustainability throughout engineering education, from primary school STEPS projects to accredited degrees and supporting members to upskill in sustainability’.

# Sustainability Implementation Modules in Biosystems & Food Engineering

**Autumn Trimester**

**BSEN20180 Intro to Env Footprinting**

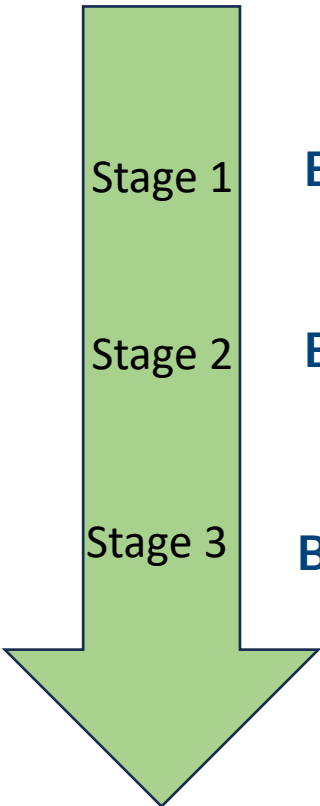
**BSEN30360 Life Cycle Assessment**

**Spring Trimester**

**BSEN10020 How Sustainable is My Food?**

**BSEN20190 Intro to Carbon and Energy Footprinting**

**BSEN30560 Measures to Mitigate Climate C**



Modules are available as electives

# BSEN10020 How Sustainable is My Food?

Credits: 5 ECTS

What will I learn?

To:

1. Explain the difference between a food item, a meal and a diet,
2. Outline the reasons for considering both sustainability and nutrition when evaluating which foods to eat,
3. Explain the environmental impacts caused by the food system, and the choice of foods you eat,
4. Record and evaluate the food you eat and identify options to reduce the adverse impacts of your food choices.

# BSEN20180 Intro to Env Footprinting

Credits: 5 ECTS

What will I learn?

To:

1. Prepare a goal and scope statement for a personal environmental footprint calculation,
2. Collect, organise and manipulate data to build a database for calculating individual environmental footprints,
3. How to quantify your water, emission, land, and ecological footprints and compare them with national and global averages,
4. Interpret the result of environmental footprint calculations to identify reduction strategies.

# BSEN20190 Intro to Carbon and Energy Footprinting

Credits: 5 ECTS

What will I learn?

To:

1. Understand the concept and importance of energy and carbon footprinting.
2. Define an appropriate goal and scope for the assessment of a carbon footprint of a product or processes.
3. Construct a representative data inventory for a specific product or process.
4. Develop an excel-based model for the calculation of a carbon footprint of a product or process.
5. Interpret the results of the carbon footprint calculation and identify areas for improvement.

# BSEN30360 Life Cycle Assessment

Credits: 5 ECTS

What will I learn?

To:

1. Prepare a goal and scope statement for an LCA of a product or process;
2. Organize and manipulate data sources to build an LCI in order to undertake an LCA of a product or process;
3. Calculate a simple LCIA (for climate change impact) of a product or process; and
4. Communicate LCA findings using ISO standard reporting and oral presentation.

# BSEN30560 Measures to Mitigate Climate Change

Credits: 5 ECTS

What will I learn?

To:

1. Identify key sources and sinks of carbon in the global carbon cycle.
2. Understand the principles in natural carbon sequestration and engineered negative emission technologies.
3. Understand where negative emission technologies contribute to Land Use, Land Use Change and Forestry (LULUCF) and the energy sector.
4. Critically assess the potential of negative emission technologies for carbon capture and storage.

# ME Biosystems and Food Engineering

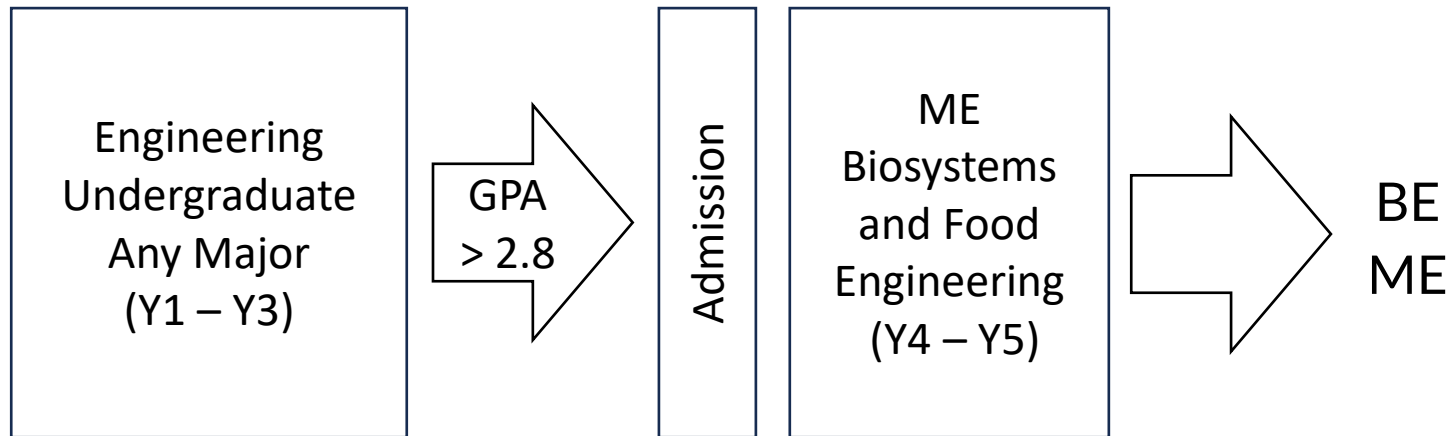
Master of Engineering (ME)  
in Biosystems and Food Engineering  
Two-Year Full Time (120 ECTS)

- The masters provides engineering graduates with the opportunity to deepen their knowledge in the design and application of sustainable biological systems for the bioeconomy, particularly in novel food process engineering, waste and wastewater management, and bioenergy.
- The masters offers 6-8 months professional work experience (generally paid) with one of UCD's industry partners in relevant area.
- Our graduates have secured graduate employment in relevant industries (e.g. Glanbia, Sanofi, Royal Oak Distillery, Guinness, Abbott, and Rowan) or full PhD Scholarships in Ireland/EU.
- [https://hub.ucd.ie/usis/!W\\_HU\\_MENU.P\\_PUBLISH?p\\_tag=PROG&MAJR=T299](https://hub.ucd.ie/usis/!W_HU_MENU.P_PUBLISH?p_tag=PROG&MAJR=T299)



# ME Entry Requirements

- For UCD Engineering Undergraduate Students (internal applicants), 3 + 2 pathway available.
- Graduate with both BE and ME after 5 years.
- Selection of ME programme will take place in Year 3.



# ME Degree Structure

## Stage 1

## Stage 2

Autumn

BSEN30010 Bioprocess Engineering Principles

BSEN30280 Water and Wastewater Engineering

BSEN40590 Unit Operations for Bioprocess Eng

MEEN30100 Engineering Thermodynamics II

MEEN30040 Measurement and Instrumentation

Option

BSEN40320 Waste to Energy Processes & Technologies

MEEN40560 Research Skills and Techniques

BSEN40710 ME Biosystems Engineering Thesis

Spring

BSEN40230 ME Professional Work Experience

BSEN30320 Food Process Engineering

BSEN40440 Food Refrigeration Engineering

BSEN40430 Professional Engineering (Management)

BSEN30140 Professional Engineering (Finance)

Summer

# Who to Contact?



Prof. Paula Bourke

Head of School

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