

# Introduction to food engineering

13-15 May 2024 Melbourne

## Short course Objectives

- introduce the basic concepts of engineering to non-engineers and graduate engineers
- focus on the chemical / physical attributes of food
- provide foundational information on various processing technologies
- provide tools for basic process analysis
- showcase how process parameters relate to product quality
- introduction to emerging technologies and digital tools

## DAY 1 – Foundations \*

	Topic	Presenter
8.30	<b>Welcome and introduction</b>	
8.45	<b>Food engineering – an overview</b> <i>basic principles, unit operations, the future</i>	Regine Stockmann, CSIRO
9.30	<b>Physical and chemical properties of food</b> <i>gross composition, density, heat capacity, thermal conductivity, viscosity, diffusivity and texture</i>	Dennis Forte, Dennis Forte & Assoc
10.15	<b>Morning Break</b>	
10.30	<b>Food safety and stability</b> <i>basic micro, food spoilage, water activity, sorption isotherms, hurdle technology</i>	Rozita Spirovska Vaskoska, CSIRO
11.15	<b>An introduction to dimensional analysis</b> <i>basic principles, dimensionless groups (nre, etc), correlations</i>	Dennis Forte, Dennis Forte & Assoc
12.00	<b>Lunch</b>	
12.30	<b>Fluid flow and rheology</b> <i>Focus on understanding Newtonian and non-Newtonian fluid flow</i>	Leonie van 't Hag, Monash University
13.15	<b>Psychrometrics</b> <i>Tdry bulb, Twet bulb, humidity, dew point, psychrometric chart</i>	Bhesh Bhandari, University of Queensland
14.00	<b>Mass and energy balances</b> <i>conservation laws, enthalpy, heat capacity, latent heat</i>	Dennis Forte, Dennis Forte & Assoc
14.45	<b>Afternoon break</b>	
15.00	<b>Heat Transfer and Mass Transfer</b> <i>conservation laws, enthalpy, heat capacity, latent heat</i>	Danyang Ying, CSIRO
15.45	<b>Thermal Processing, refrigeration and chilling technology</b> <i>rate of microbial inactivation, fo, d values, physical interaction for product stability</i>	Danyang Ying, CSIRO
16.30	<b>End of day 1</b>	

## DAY 2 – Process applications\*

	Topic	Presenter
08.30	<b>Size reduction technology</b> <i>Cutting, grinding, homogenizing and emulsification</i>	Darren Gardiner, CSIRO
9.15	<b>Fluid mixing technology</b> <i>Agitator types, mixing dynamics, process control, static mixers</i>	Dennis Forte, Dennis Forte & Assoc
10.00	<b>Morning Break</b>	
10.15	<b>Fluid flow in pipes</b> <i>Pressure drop calculation, alternative fans &amp; pumps, npsh, pump / fan curves</i>	Dennis Forte, Dennis Forte & Assoc
11.00	<b>Drying technology – Part 1</b> <i>Drying principles, drying curves, moisture diffusivity and dryer types (batch vs continuous)</i>	Henry Sabarez, CSIRO
11.45	<b>Drying technology – Part 2</b> <i>Tray, conveyor, spray dryers, fluid beds, evaporators, freeze drying</i>	Darren Gardiner, CSIRO
12.30pm	<b>Lunch</b>	
13.00	<b>Solids mixing technology</b>	Dennis Forte, Dennis Forte & Assoc
13.45	<b>Centrifugal separation technologies</b>	Mark Player, Flottweg
14.30	<b>Membrane separation technology</b>	Filip Janakievski, CSIRO
15.15	<b>Afternoon break</b>	
15.30	<b>Demonstrations – FPC and lab</b> <i>Separations technologies, other? and rheology in lab</i>	
17.00	<b>End of day 2</b>	

### Day 3 – Process applications and the future of food engineering\*

	Topic	Presenter
08.30	<b>Dough mixing and handling</b> <i>Rolling and sheeting</i>	Dennis Forte Dennis Forte & Assoc
09.15	<b>Extrusion technology</b>	Eddie Attenborough Monash University
10.00	<b>Morning Break</b>	
10.15	<b>Food process scale-up</b>	Craig Bolch Process Partners
11.00	<b>The role of packaging</b>	Ralph Moyle, Australian Institute of Packaging
11.45	<b>Plant Design for food grade operations</b>	Asgar Farahnaky, RMIT University
12.30pm	<b>Lunch</b>	
13.00	<b>Cleaning and sanitation</b>	Hong Lee Lim, IXOM
13.45	<b>Process modelling and simulation</b>	Francisco Trujillo, University of NSW
14.30	<b>New and emerging technologies</b> <i>HPP, ultrasonics, PEF,</i>	Roman Buckow, LaTrobe University
15.15	<b>Afternoon break</b>	
15.30	<b>Digital technologies</b> <i>Sensors, modelling, digital twins, etc</i>	TBC, Swinburne University of Technology
16.15pm	<b>Final wrap up and end of course</b>	

\*Program is subject to change