

Module Title:	The Brewing Process
Language of Instruction:	English
Credits:	10
NFQ Level:	7
Module Delivered In	No Programmes
Teaching & Learning Strategies:	The full time version of the module will be delivered as 2h lecture per week. These lectures provide the learner with a broad overview of each topic in the syllabus. Learners will be required to supplement this with significant independent reading. Key analytical and applied competency skills are developed by learners in a laboratory environment 2h per week whilst working both individually and in groups. The part time version of the module will be delivered as 3h theory/practical class for 20 weeks. Learners will be exposed to theory and practice through exposure to and study of academic materials and industry practice materials. Learners will be required to actively engage with module materials and problem solving exercises.
Module Aim:	The aim of this module is to provide students with an understanding of the brewing process including wort production, separation and boiling
Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Describe the stages involved in the malting process including steeping, germination and kilning and be able to conduct the analyses required to detect malt quality
LO2	Explain the milling process including malt handling procedures, techniques used during grist preparation and the different mill types
LO3	Evaluate the effects of milling on the composition and quality of the final product
LO4	Discriminate the biochemical and physiological reactions during mashing and understand wort composition and separation
LO5	Explain the processes required to remove hop and hop product debris from wort, and examine the processes involved in wort cooling, dilution and aeration
LO6	Develop the practical skills and techniques required for the brewing process
Pre-requisite learning	
Module Recommendations <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
Incompatible Modules <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
Co-requisite Modules	
No Co-requisite modules listed	
Requirements <i>This is prior learning (or a practical skill) that is mandatory before enrolment in this module is allowed.</i>	
No requirements listed	

Module Content & Assessment

Indicative Content
Barley Barley intake, storage, drying, separation and grading
Malting process Steeping, steep regimes and air rests; germination, moisture, temperature, biochemical changes, malting loss; kilning, free drying, forced drying, curing, kiln technology, biochemistry of kilning; malt analysis, malt quality, speciality malts
Water Brewing water, source, composition, management
Hops Hop biology and cultivation, chemical composition, hop products, hops in the brewing process, analysing hop quality
Milling Malt handling procedures, dry goods, malt dust; techniques used during grist preparation; mill types and operation; effect of milling on composition and quality of beer
Mashing biochemistry of mashing; mashing techniques and regimens; wort composition, separation, Darcy's law; wort boiling, process and equipment, wort classification, wort cooling, dilution, aeration
Fermentation Centrifugation, flocculation, maturation, clarification, packaging
Practicals 1. Milling and mashing regimes/enzyme analysis. 2. Water analysis – ion content. 3. Sweet wort separation and composition – sugar and amino acid/total N analysis. 4. Wort boiling, hop conversion, estimation of bitterness/iso-alpha acids. 5. Beer fermentation, oxygen, pitching, monitoring of fermentation/OG-PG/pH/PP/attenuation. 6. Green beer processing: separation, flocculation, centrifugation, clarification. 7. Beer maturation/gyle/GC analysis of diacetyl and acetaldehyde. 8. Bright beer polishing/packaging. Estimation of oxygen content/oxygen flavour damage. 9. Packaged beer testing: Haze, colour, gravity, alcohol content, pH, acidity, bitterness, oxygen, carbon dioxide, head space air content. 10. Bacterial and yeast contamination of beer and the brewery environment.
Adjuncts and other cereals Other cereals and adjunct raw materials. Gluten free raw materials. Alcohol-free and diat beers. Industrial enzymology and malting.
Wort Separation Operation of lauter tuns, mash filters. Trub removal from hopped wort ex kettle.
Carbonation Carbonation. CO2 production in breweries. Carbonation of final beer. CO2 measurement in bottle/kegs.

Assessment Breakdown	%
Continuous Assessment	10.00%
Practical	40.00%
End of Module Formal Examination	50.00%

Special Regulation

Students must achieve a minimum grade (35%) in both the practical/CA and final examination.

Continuous Assessment

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	Short exam	1,2,3,4,5	10.00	n/a

No Project

Practical

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Laboratory work	6	40.00	n/a

End of Module Formal Examination

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Final examination	1,2,3,4,5	50.00	End-of-Semester

Continuous Assessment				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Examination	n/a	1	10.00	n/a

No Project

Practical				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Practical/Skills Evaluation	n/a	3,4,6	40.00	n/a

End of Module Formal Examination				
<i>Assessment Type</i>	<i>Assessment Description</i>	<i>Outcome addressed</i>	<i>% of total</i>	<i>Assessment Date</i>
Formal Exam	n/a	1,2,4,5	50.00	End-of-Semester

SETU Carlow Campus reserves the right to alter the nature and timings of assessment

Module Workload

Workload: Full Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	30 Weeks per Stage	2.00
Laboratory	30 Weeks per Stage	2.00
Independent Learning	30 Weeks per Stage	2.00
Total Hours		180.00

Workload: Part Time		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Practicals	20 Weeks per Stage	3.00
Independent Learning	20 Weeks per Stage	7.00
Total Hours		200.00

