

<b>Module Title:</b>	Malting and Brewing Raw Materials
<b>Language of Instruction:</b>	English
<b>Credits:</b>	5
<b>NFQ Level:</b>	7
<b>Module Delivered In</b>	No Programmes
<b>Teaching &amp; Learning Strategies:</b>	Learners will be exposed to theory and practice through exposure to and study of academic materials (texts, journals etc.) industry practice materials (case studies, live case examples, industry reports etc.). Learners will be expected to actively engage with module materials (online & offline) and problem solving exercises. The part time module 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.
<b>Module Aim:</b>	The aim of this module is to examine the raw materials utilised in the malting and brewing processes and to develop an understanding of how raw materials influence the final product

Learning Outcomes	
<i>On successful completion of this module the learner should be able to:</i>	
LO1	Describe the structure, morphology and growth of barley grains, the biochemistry of barley germination and how it influences the brewing process
LO2	Critically evaluate how physiological and biochemical factors of barley can influence malt quality
LO3	Appreciate the significance of water in the brewing process and understand the effects of water hardness and ion composition on the brewing process
LO4	Understand the methods for treating brewing water
LO5	Describe the structure and cultivation of hops, the chemical composition of hops and its influence on the final product
LO6	Evaluate the theory and practice of hop utilisation and detail the analytical techniques utilised in the assessment of hop quality

Pre-requisite learning	
<b>Module Recommendations</b> <i>This is prior learning (or a practical skill) that is recommended before enrolment in this module.</i>	
No recommendations listed	
<b>Incompatible Modules</b> <i>These are modules which have learning outcomes that are too similar to the learning outcomes of this module.</i>	
No incompatible modules listed	
<b>Co-requisite Modules</b>	
No Co-requisite modules listed	
<b>Requirements</b> <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**

Composition, growth and development. Barley selection, requirements for malting. The malting process. Biochemistry of barley germination: endosperm, starch, proteins, fats, phosphates etc. Dormancy/viability. Gibberellic acid. Enzyme activity. The chemistry of kilning. Extraction prediction. The use of malt outside of brewing/distilling.

**Water**

Water in brewing; softening and deionization; calcium and bicarbonate ions. Chemical and microbial contamination of water. Water in cleaning, sterilizing, cooling and heating. Steam generation. Heat exchangers. Effluent treatment.

**Hops**

Growing, selection, diseases, harvesting and drying. Hop chemistry, hop products. Chemistry of hop constituents, analysis of hops and hop products. Deterioration of hop flavour. Chemistry of hop boiling, isomerized hop extracts. Analysis of bitter principles.

**Practicals**

Moisture content of barley/malt; Protein content; Diastase activity; Beta-glucanase activity; Dormancy testing: Germination energy/capacity; EBC extract estimation; Texture/friability/screenings testing;

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 examination	1,2,3,4,5,6	10.00	n/a

No Project

**Practical**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Laboratory books and assignments	2,4	40.00	n/a

**End of Module Formal Examination**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Formal Exam	Final examination	1,2,3,4,5,6	50.00	End-of-Semester

**Continuous Assessment**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Examination	In class examination	1,2,5	10.00	n/a

No Project

**Practical**

Assessment Type	Assessment Description	Outcome addressed	% of total	Assessment Date
Practical/Skills Evaluation	Laboratory work and off-site applied learning	3,4,6	40.00	n/a

**End of Module Formal Examination**

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

**Module Workload**

<b>Workload: Full Time</b>		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Lecture	30 Weeks per Stage	2.00
Practicals	30 Weeks per Stage	1.00
Independent Learning	30 Weeks per Stage	1.17
Total Hours		125.00

  

<b>Workload: Part Time</b>		
<i>Workload Type</i>	<i>Frequency</i>	<i>Average Weekly Learner Workload</i>
Laboratory	15 Weeks per Stage	3.00
Independent Learning	15 Weeks per Stage	3.67
Total Hours		100.00

