



Qualifications

The General Certificate in Distilling (GCD)

Examination Syllabus November 2019

Unit 1: Introduction to Distilling

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Introduction to distilling	<ol style="list-style-type: none"><li>1. Definitions of the main spirits derived from cereal, molasses, grape and agave.<li>2. The basic process flows for the production of the major spirits categories.

Unit 2: Raw Materials

Lesson: Cereal

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Cereals for whisk(e)y production	<ol style="list-style-type: none">1. Why we use cereals for distilling.2. The key characteristics/qualities of the main distilling cereals.

Lesson: Cereal – Malting Process

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Cereals and the malting process	<ol style="list-style-type: none">1. Key structures within a barley kernel.2. Key stages within the malting process and associated technology.3. The structural changes that occur in the barley kernel during the malting process.4. The key enzymes active during the malting process.5. The production of peated malt.6. Key malt analytical parameters

Lesson: Molasses

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
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<p>Sugar cane and how it is processed to make molasses for rum production</p>	<ol style="list-style-type: none"> 1. The origin of molasses: sugar cane. 2. Sugar cane properties, areas of sugar cane production and geographical impact on quality. 3. Differences between sugar cane juice and molasses, based on quality and composition. 4. Sugar cane processing methods, and the technology used to make molasses. 5. The various types of molasses. 6. Molasses storage requirements. 7. The chemical and biological properties of molasses. 8. Use of the Brix hydrometer and measurement of sugar content: sugar % (w/w) and degrees Brix (°Brix). 9. Key molasses analytical parameters.
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Lesson: Grape

<p>Topics</p>	<p>Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:</p>
<p>Grapes for brandy production</p>	<ol style="list-style-type: none"> 1. Grapevine cultivation <ul style="list-style-type: none"> ○ General description of a grapevine ○ Growth and care from planting to harvest ○ What constitutes terroir 2. Factors that affect the choice of grape varieties for distillation. 3. Grape and juice composition 4. Grape selection criteria for distillation. 5. Other fruit brandy

Lesson: Agave

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Agave for tequila production	<ol style="list-style-type: none"> 1. Agave basic anatomy and composition. 2. Cultivation and growth cycle. 3. Harvesting and where it is grown. 4. Alcoholic beverages from Agave including tequila, mezcal and sotol.

Lesson: Botanicals

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Botanicals for gin production	<ol style="list-style-type: none"> 1. The cultivation, selection, and use of the four primary gin botanicals (juniper, coriander, citrus peel and orris root). 2. Secondary gin botanicals. 3. Botanicals storage requirements.

Lesson: Water

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Water for use in distilling	<ol style="list-style-type: none"> 1. The various sources of water including borehole, surface, municipal/public. 2. Product water, in terms of: <ol style="list-style-type: none"> a. Colour, clarity, taste, odour and pH b. Contaminants, including microbiological and taints 3. Dissolved salts and their importance. 4. The categories of water and their attributes. 5. Water conservation and the reliability and consistency of supply and their importance..

Lesson: Yeast

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Distiller's yeast	<ol style="list-style-type: none"><li>1. The major components of the yeast cell and how they function.<li>2. The process by which yeast cells multiply.<li>3. The various types of yeast used in distilling (cream, pressed and dried)<li>4. Yeast selection and storage requirements.<li>5. Pure culture yeast for natural fermentation.

Unit 3: Raw Material Processing

Lesson: Cereal – Milling and Mash Conversion

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none">1. The principles of milling.2. The principles of mashing.
Process - Milling	<ol style="list-style-type: none">3. The key steps of grain intake and the accompanying safety risks.4. Calculating the amount of grain required for a batch of whisk(e)y.5. Important parameters for successful milling.6. The appearance of milled grain and grist sieve analyses.
Technology – Milling	<ol style="list-style-type: none">7. Types of milling systems and basics of operation.
Process – Mashing and Cereal Cooking	<ol style="list-style-type: none">8. Key mashing process parameters.9. Key biochemical changes in the grain during mashing and factors that affect this.10. The role of malt enzymes and factors that affect their efficiency.11. The use of exogenous enzymes.12. The purpose and process of grain cooking.
Technology – Mashing and Cereal Cooking	<ol style="list-style-type: none">13. Mashing system technology.14. Grain cooking technology.

Lesson:

Cereal – Wort Separation and Cooling

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none">1. The principles of wort separation.2. The principles of wort cooling.
Process – Wort separation	<ol style="list-style-type: none">3. Overview of the wort separation process and the key process parameters. <i>Note – this process is optional for grain whiskey and grain neutral spirit production.</i>4. The impact of secondary conversion.5. Key wort composition requirements.
Technology – Wort separation	<ol style="list-style-type: none">6. Wort separation systems.7. Wort separation system selection based on milling system.
Process - Wort cooling	<ol style="list-style-type: none">8. Purpose of wort cooling and an overview of the process.
Technology – Wort cooling	<ol style="list-style-type: none">9. Wort cooling systems.

Molasses

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none">1. Why we need to pre-treat molasses.

Lesson:

Process	<ol style="list-style-type: none">2. Various pre-treatment methods for molasses.3. Sugar content adjustments needed for downstream production stages.4. How fermentation can be adjusted via the use of stillage or dunder.
Technology	<ol style="list-style-type: none">5. Removal of solids and scale by centrifugation.6. Use of heat treatment (pasteurisation or sterilisation) and/or antibiotics to reduce microbial count.

Lesson: Grape

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none">1. Choosing when to harvest for optimum yield and quality.
Process	<ol style="list-style-type: none">2. Common grape harvesting methods.3. Choosing when to press the grapes.4. Key grape processing stages: sorting, destemming and crushing.
Technology	<ol style="list-style-type: none">5. Pressing systems.

Agave

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
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Lesson:

Overview	<ol style="list-style-type: none">1. The purpose of processing agave prior to fermentation.2. Inulin and why it is important to the process.
Process	<ol style="list-style-type: none">3. Agave cooking process.4. Milling process.5. Mixto tequila and how it changes the process stream.
Technology	<ol style="list-style-type: none">6. Agave cooking systems, including pits, ovens, autoclaves and diffusers.7. Milling systems, including tahona and modern mills.

Unit 4: Fermentation

Lesson: Fermentation Theory and Technology

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. The principles of alcoholic fermentation including key fermentable sugars.
Process	2. Typical phases of fermentation. 3. The role of other organisms that may be present during fermentation. 4. Factors affecting fermentation. 5. The products of fermentation with emphasise on alcohol yields and flavour congeners. 6. Key flavour compounds developed during fermentation.
Technology	7. Fermentation systems and their materials of construction. 8. Key requirements for a typical fermenter.

Lesson: Cereal

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. Key stages of a cereals-based wort fermentation. 2. Nutritional requirements of distilling yeast, to be provided by wort: sugars, amino acids, mineral salts, vitamins. 3. Impact of regulations on cereal-based wort fermentation.
Process	4. Calculation of yeast inoculation rate. 5. Key stages of a cereals-based wort fermentation cycle. 6. The importance of secondary conversion. 7. Key analytical fermentation parameters.

Technology	8. Fermentation systems for cereal-based wort.
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Lesson: Molasses

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none"> 1. Differences between fermentation for light and heavy rum production. 2. Selection criteria for different yeast types for molasses fermentation.
Process	<ol style="list-style-type: none"> 3. Yeast pitching procedures for molasses fermentation. 4. Molasses fermentation process for light rum production. 5. Molasses fermentation processes for heavy rum production. 6. Yeast nutritional requirements for molasses fermentation. 7. Batch incremental feed fermentation process. 8. Benefits and challenges of yeast recycling.

Lesson: Grape

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none"> 1. Yeast selection for grape juice fermentation to produce brandy. 2. Grape juice fermentation requirements.
Process	<ol style="list-style-type: none"> 3. Yeast pitching procedures. 4. Addition of yeast nutrients. 5. Key aspects of the grape juice fermentation process, including the malolactic fermentation. 6. Grape juice fermentation control parameters. 7. The major organisms that contribute to wine spoilage.
Technology	<ol style="list-style-type: none"> 8. Grape juice fermentation systems.

Lesson: Agave

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. Agave fermentation yeast selection.
Process	2. Agave fermentation requirements and control parameters.
Technology	3. Agave fermentation systems.

Unit 5: Distillation

Lesson: Basics of Distillation

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none">1. Key terminology associated with spirits distillation.2. Theory of distillation, including the liquid/vapour equilibrium and volatility of components using a graphic model.
Process	<ol style="list-style-type: none">3. Differences between batch pot and continuous distillation methods.4. Role of copper in distilled spirits production.
Technology	<ol style="list-style-type: none">5. Distillation systems available.

Lesson: Batch Pot Distillation

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none">1. The purpose of pot still distillation in spirits production.
Process	<ol style="list-style-type: none">2. The operation of a two-stage pot distillation process using the liquid/vapour equilibrium.3. Changes to spirit cut points and the effect they can have on spirit quality.4. Other styles of batch pot distillation, including triple distillation and batch distillation with plates.
Technology	<ol style="list-style-type: none">5. The different types of vapour condensing systems.6. Key batch distillation condensing system technology – worm tub and shell and tube.

Lesson: Continuous Distillation

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. The purpose of continuous distillation in spirits production.
Process	2. The basic operation of a two-column continuous distillation process. 3. The inputs and outputs of distillation; describe what a balanced operation is. 4. The material and heat balance. 5. The importance of composition, and of pre-heating still feed materials.
Technology	6. Continuous distillation systems.

Lesson: Whisk(e)y

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. Differences between malt and grain whisk(e)y processes.
Process	2. Malt whisk(e)y batch pot distillation process. 3. Condensate recovery. 4. Grain whisk(e)y Coffey still continuous distillation process. 5. Handling of feints. 6. Fusel oil removal and recovery.
Technology	7. Stripping and rectifying columns. 8. How the design of the pot affects product quality and process operations. 9. The different types of vapour condensing systems.

Lesson: Rum

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. Differences between batch and continuous distillation for rum production.
Process	2. Operation of the pot still for heavy rum production. 3. Operation of column stills for light rum production. 4. How the column still can be used for neutral spirits production. 5. The importance of rectification.
Technology	6. Design of the pot still for heavy rum production. 7. Design of column stills for light rum production.

Lesson: Brandy

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. The definition of neutral brandy, cognac and Armagnac. 2. What grappa is.
Process	3. Continuous distillation processes for producing neutral brandy. 4. Double distillation process for producing cognac. 5. Semi-continuous distillation process for producing armagnac. 6. The grappa distillation process.
Technology	7. The types of stills used in brandy production, including the albemic charentais and armagnac stills. 8. The grappa vapour still.

Lesson: Agave Spirits

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. Agave distillation techniques.
Process	2. Continuous distillation process and its use in twice distilled tequila production. 3. Batch pot distillation process for tequila production. 4. Mescal production methods.
Technology	5. Tequila pot still design. 6. Mescal clay stills design.

Lesson: Neutral Spirit and Vodka

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. Definition of neutral spirit. 2. Where neutral spirit is used within the distilling industry. 3. Key differences between grain whisk(e)y and neutral spirit. 4. Definition of vodka.
Process	5. The processes involved in the production of neutral spirit. 6. The processes involved in vodka production.
Technology	7. General continuous distillation technology for neutral spirit production.

Lesson: Gin

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:

Overview	1. Base spirit selection for gin production.
Process	2. Gin production methods – distilled and compound gin. 3. Key steps in the gin distillation process. 4. Production of flavour extracts. 5. Assessing gin quality.
Technology	6. The vapour basket.

Unit 6: Maturation and Blending

Lesson: Maturation in Wood

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. Purpose of cask maturation.
Process	2. Reasons for using wood for spirit maturation. 3. Maturation in wood control parameters. 4. Process/changes during maturation. 5. Characteristics of new and mature spirit. 6. Alternatives to maturation in wood that will give similar flavour changes. 7. Reasons for blending. 8. The various post-maturation processes and treatments that can be carried out prior to bottling, including blending, reduction, caramel addition, filtration and filling temperature control.
Technology	9. Manufacture of casks and their use in production. 10. Main types of cask wood 11. Use of treated casks, or casks used previously to hold another beverage (e.g. port, sherry, wine etc.) to produce whisky “finishes”.

Lesson: Whisk(e)y

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. What is meant by warehousing and blending in relation to whisk(e)y.

Process	<ol style="list-style-type: none"> 2. The term inventory. 3. What legislative requirements apply to Scotch whisky maturation and blending processes.
Technology	<ol style="list-style-type: none"> 4. The various types of cask and warehouse design.

Lesson: Rum

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none"> 1. Types of rum – white, amber, dark.
Process	<ol style="list-style-type: none"> 2. Rum maturation process and impact on flavour. 3. Rum blending process.
Technology	<ol style="list-style-type: none"> 4. Barrel types for rum maturation.

Lesson: Brandy

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	<ol style="list-style-type: none"> 1. Types of wood used in brandy maturation.
Process	<ol style="list-style-type: none"> 2. The process of aging brandy in barrels. 3. Spirit dilution method. 4. Basic blending practices. 5. Barrel warehouse control parameters.
Technology	<ol style="list-style-type: none"> 6. How a brandy barrel is made: wood seasoning, toasting, barrel size

Lesson: Tequila and other Agave Spirits

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Overview	1. Types of aged tequila.
Process	2. Tequila maturation process. 3. Basics of tequila blending. 4. The additives permitted for use both during and post-blending. 5. Aging other agave spirits.
Technology	6. The types of casks used for tequila.

Unit 7: Quality

Lesson: Process Control

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Process and product consistency	1. Variation and variability. 2. The purpose of a specification. 3. The concept of tolerance for specification ranges. 4. Simple statistical quality control procedures. 5. Simple methods for recording, reporting and the interpretation of data. 6. The key distilling measurable parameters and their influence on quality. 7. The principles of monitoring and adjustment to achieve product consistency. 8. Typical applications for in-line and on-line instrumental process control.

Lesson: Quality Management Systems

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Features of a quality system	<ol style="list-style-type: none"> 1. The definition and benefits of a quality management system. 2. The four main processes to implement a quality management system. 3. Examples of quality management systems and their key principles.
Product safety	<ol style="list-style-type: none"> 4. The typical steps in implementing a HACCP system.

Lesson: Sensory Assessment

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Flavour control and sensory assessment of spirits.	<ol style="list-style-type: none"> 1. Flavour: What is it and where does it come from? 2. Importance of flavour control. 3. Role of sensory evaluation in controlling flavour. 4. The sensory assessor (panellist or blender) 5. Preparing samples for sensory testing. 6. Sensory test room conditions. 7. Types of sensory tests and when to use them: <ol style="list-style-type: none"> a. Sample screening b. Difference testing c. Descriptive analysis <ol style="list-style-type: none"> i. Flavour wheels ii. Flavour profiling.

Unit 8: Hygiene

Lesson: Microbiological Contamination and Control

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Microbiological contamination	<ol style="list-style-type: none"> 1. Definition of bacteria and fungi and examples of those commonly found in distilleries. 2. Methods for detecting microbiological contaminants.
Microbiological control	<ol style="list-style-type: none"> 3. The principle ways to achieve microbiological control in a distillery and in particular to the following key areas: <ol style="list-style-type: none"> a. Yeast handling systems b. Product and process waters 4. The types of chemical, light and heat sanitisers commonly used.

Lesson: Plant Cleaning

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
CIP systems	<ol style="list-style-type: none"> 1. Four key factors for efficient plant cleaning. 2. The different types of detergents used and the reasons for their choice 3. The types of cleaning head used and reasons for their choice. 4. Differences between single use and recovery systems 5. The operating principles of CIP systems.
CIP cleaning cycles	<ol style="list-style-type: none"> 6. Typical cleaning programs and cycle times. 7. The function of each of the cleaning cycle stages.
CIP plant design	<ol style="list-style-type: none"> 8. Design features that minimise dirt accumulation in vessels and pipelines and encourage efficient cleaning. 9. Design features which promote a hygienic working environment.

Unit 9: Engineering and the Environment

Lesson: Engineering and Maintenance

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Approaches and tasks	<ol style="list-style-type: none">1. The business motives for an effective maintenance system.2. The features, advantages, disadvantages and applications of the following approaches: No maintenance, Corrective Maintenance and Preventative Maintenance.3. The relationship between corrective and preventative maintenance.4. The contribution of routine maintenance tasks to plant safety, reliability, quality, economics and environmental impact.
Performance improvement	<ol style="list-style-type: none">5. The key features of the following performance orientated maintenance systems: Reliability centred maintenance (RCM), Total productive maintenance (TPM), Workplace Organisation (6s), and Condition Monitoring.

Lesson: Environment and Utilities

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Sustainability and climate change	<ol style="list-style-type: none">1. The guiding principles of sustainability, and the concepts of a sustainable industry.2. The role of carbon dioxide and the carbon cycle.3. The principal sources of carbon dioxide.

Steam and Energy	<ol style="list-style-type: none"> 4. The main uses of steam in distilling. 5. The difference between direct and indirect use of steam and explain the implications of steam quality. 6. The potential dangers of steam and steam distribution systems. 7. The principal energy consuming activities in a distillery. 8. Heat recovery systems in distilleries, e.g. condensate recovery system.
Water	<ol style="list-style-type: none"> 9. Categories of water: product water, process water and service water. 10. Basic principles of a water treatment plant. 11. Prevention of <i>Legionella</i> infection in cooling towers.

Lesson: Effluent

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Sources of effluent and measurement	<ol style="list-style-type: none"> 1. The measurement of effluent volume and strength: biological and chemical oxygen demand, suspended solids, volume, pH and temperature. 2. Control methods used for reducing effluent.
Effluent treatment technologies	<ol style="list-style-type: none"> 3. Aerobic and anaerobic systems and their relevant application. 4. Temperature, flow, copper and pH considerations for consented discharge to sewer.

Lesson: Co-products (General and Whisk(e)y)

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:

Co-products	<ol style="list-style-type: none"> 1. The definition of a co-product. 2. The potential value of a co-product to a distiller.
Range of distillery coproducts and preparation of animal feed	<ol style="list-style-type: none"> 3. Carbon dioxide recovery process. 4. The recovery process of fusel oil from continuous distillation spirits production. 5. Explaining why cereal residues are ideal as animal feed, or as a source of carbon for biomass. 6. Cereal residue recovery processes.

Lesson: Co-products (Rum)

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Range of distillery coproducts	<ol style="list-style-type: none"> 1. Bagasse and its uses. 2. Waste streams from the rum fermentation and distillation process.

Lesson: Co-products (Brandy)

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
Range of distillery coproducts	<ol style="list-style-type: none"> 1. Various uses for grape stems. 2. Various uses for grape seeds. 3. Various uses for grape skins.

Lesson: Health and Safety

Topics	Candidates should understand and be able to explain and describe in simple terms, or demonstrate familiarity with:
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Health and safety	<ol style="list-style-type: none">1. Flammability and explosion risks of alcohol.2. Fire and explosion dangers at stills, in storage and operations involving spirits.3. Hazards and risks from dust and carbon dioxide.4. The essential precautions needed in the distillery in order to make it a safe working environment.
Detergents and sterilants	<ol style="list-style-type: none">5. The hazards associated with chemical cleaning and sterilising agents.6. Good practices for the storage of chemicals.7. Use of personal protective clothing.8. Procedures in case of accidental spillage or discharge of chemicals.