Gem-A Gem Diamond Diploma Syllabus

Contents

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Scheme of assessment

The course will contain coursework and end of course examinations. The course is comprised of two parts the theory and practical. Students need to pass both sections to pass this course:

Title	Mode of assessment	Duration	Weighting
Theory component:*			
Gem Diamond paper 1	Written examination	3 hrs	84%
Coursework	4 Online assignments	-	16%
Practical component:			
Practical endorsement	Coursework	-	Completion required
Gem Diamond practical paper 2	Written examination	2.5 hrs	100%

**Coursework is in the form of assessed coursework which will be computer marked and tutor assessed.*

The theory course is broken into four areas of study:

Block 1 – Introduction, Diamond History, and Magnification/Observation

Content:

- Section 1 - Diamond - The Ideal Gemstone
- Section 2 - The History Of Diamonds
- Section 3 - Observation And Magnification

At the end of Block 1, students should be able to:

- understand why diamond is the ideal gemstone.
- Summarize the history of diamond discoveries worldwide.
- recognize, recall and show understanding of the importance of these historical discoveries, and their impact on the world market.
- demonstrate a knowledge and understanding of the principles of observation using both 10x loupe and microscope, and be able to make, record, sketch and communicate reliable and valid observations.

Block 2 - Introducing and Explaining the Diamond Pipeline from Geology to Jewellery

Content:

- Section 4 – The Structure And Nature Of Diamonds
- Section 5 – The Physical Properties Of Diamond And Their Uses.
- Section 6 – Light And Diamonds Optical Properties
- Section 7 – Diamond Types And Colour In Diamond

At the end of Block 2, students should be able to:

- describe the structure and bonding of atoms within diamond.
- explain how this bonding creates the crystal forms seen in nature.
- describe the physical properties of diamond, and how these are utilized in the mining, cutting, and testing processes.
- describe the optical properties of diamond, and how these are used to create and influence the final cut diamond.
- summarize the components of, and uses for, the electromagnetic spectrum.
- demonstrate a knowledge of the different colours that can exist within diamond, and the chemical, atomic, or vibronic causes of them.
- recognize the criteria differentiating between different diamond types, and explain how these diamond types form, and can be identified.

Block 3 - Introducing and Explaining the Diamond Pipeline from Geology to Jewellery, and Rough Diamonds

Content:

- Section 8 – The Geology Of Diamonds
- Section 9 – Diamond Mining And Extraction
- Section 10 – The Diamond Pipeline
- Section 11 – Rough Diamonds
- Section 12 – Diamond Manufacture And Quality Of Cut

At the end of Block 3, students should be able to:

- describe the geological process in relation to diamond origins.
- explain how occurrence and locality may affect the mining and recovery of diamonds
- describe the process of manufacturing diamond.
- summarize the history of diamond cutting and styles.
- describe the process of diamond recovery grading, the systems used and how these grades affect the value of a diamond.
- demonstrate and show a knowledge and understanding of the ethical, social, economic, environmental and technological implications of the diamond pipeline.
- explain and expand upon cutting methods, and acceptable tolerances, and how these affect the final quality of cut.

Block 4 - Identifying Comparing and Contrasting Diamonds, Synthetics and their Various Treatments

Content:

- Section 13 – Diamond Grading
- Section 14 – Diamond In Jewellery
- Section 15 – Diamond Simulants
- Section 16 – Synthetic Diamonds
- Section 17 – Diamond Treatments
- Section 18 – Diamond Testing

At the end of Block 4, students should be able to:

- recognize, recall and show an understanding of natural, treated and synthetic diamonds
- describe the different systems used to grade diamonds worldwide, and critically compare them.
- understand the different ways in which diamonds can be set in jewellery, and the different techniques available.
- compare and identify diamond and its simulants.
- summarise the observational and testable differences between diamond and these simulants.
- summarise the techniques used to create synthetic diamond, and the differing requirements of each technique.
- identify the characteristics of synthetic diamonds, and how to recognise them.
- explain the various treatments available to alter colour and clarity within a diamond.
- discuss how these treatments can be identified
- interpret, explain, evaluate and communicate the results of diamond testing clearly and logically using gemmological knowledge and using appropriate specialist vocabulary.

Practical endorsement

Assessment of students practical work is made by a Gem-A approved practical tutor and moderated externally by Gem-A.

Students need to be able to demonstrate a competence at grading a diamond.

Students need to cover the following areas:

- use of the 10x lens.
- clarity grading using a 10x lens.
- estimating the colour grade of a stone.
- analysing the cut of the stone with the unaided eye and the 10x lens.
- identifying clarity treatments with the 10x lens.
- distinguishing diamond from its common simulants using observation and 10x lens.
- use of the diamond probes for testing diamonds
- recognizing, describing and sketching rough diamond crystals.
- use of the carat balance.
- use of the gauge to estimate the weight of mounted diamonds.

Gem diamond written examinations

The question papers at the end of the Gem Diamond course have a common format. The theory paper includes questions requiring more extended answers.

- Paper GD1 — Theory examination - 3 hours
- Paper GD2 — Practical examination – 2.5 hours

Sample papers can be obtained in pdf format from the online course resources page.

Results and grades

There are two components to this course, the theory and the practical. Both components receive separate grades.

Grade	% Limits	Result
A*	80 - 100	Pass
B*	60 - 79	Pass
C	40 - 59	Re-sit final exam
D	20 - 39	Re-sit final exam
E	0 - 19	Re-sit course section (including any coursework)

*Students with one or more wrong identification in the practical paper can achieve a C grade at the highest for the practical component and will be required to re-sit the practical paper.

A and B are pass grades; C, D and E are fail grades. Students are required to pass both the theory and practical components to pass this course.

Distinctions are awarded to students with A/A grades, merits are awarded to students with an A grade, and a high B grade (75% or higher).

Students are required to sit the practical exam either in the same sitting or prior to the theory examinations. In order to be eligible for a distinction or award students must sit all their examinations within one year. More than one type of award may be given. See Gem-A's website for further details on this.

Re-sits: Students with a pass grade in the practical will have their practical grade held indefinitely and can re-sit the theory at any time. This also applies to students who pass the theory, but fail the practical. Following any re-sit, candidates are not eligible for a Distinction, Merit or for any award

A Gem Diamond Diploma is awarded to qualifying candidates.

Gem Diamond syllabus

This syllabus indicates the possible areas of the subject which can be examined in the Gem Diamond examination.

The maximum level of detail required is indicated in certain parts of the syllabus.

Due to the specialised nature of the Gem Diamond course and the need for accurate and reliable study materials Gem-A provides course notes to guide and assist students through the course and final examinations; however, additional reading around the subject is always recommended. For further information about the course materials available please contact Gem-A.

The specific level and amount of information required in the examination is also indicated by the potential marks printed next to each examination question.

The numbers on this syllabus relate to the relevant course section numbers.

GD1. Diamond – The Ideal Gemstone

- Introduction to diamonds; diamonds in the gem and jewellery trade; brief introduction to the diamond pipeline; diamond – the ideal gemstone; the 4 C's of diamond.

GD2. The History Of Diamonds

- The different cultural attitudes to diamond; diamond localities; the brief history of diamond polishing; listing of famous and/or historical diamonds.

GD3. Observation And Magnification

- Transparency; lustre; optical effects; observation; magnification; inclusions in diamond.

GD4. The Structure And Nature Of Diamonds

- An introduction to elements, atoms, and atomic bonding; the basics of crystallography; observation of rough diamond forms; surface morphology and features; directional properties in diamond.

GD5. The Physical Properties Of Diamond And Their Uses

- Durability of diamonds; Weight, mass, density and specific gravity; thermal properties of diamond; electrical properties of diamond; wettability.

GD6. Light And Diamonds Optical Properties

- Light energy and light waves; optical properties of diamond; tools for testing the optical properties exhibited by diamond.

GD7. Diamond Types And Colour In Diamond

- The electromagnetic spectrum; colour and its causes; diamond classification and how colour affects this; luminescence – fluorescence, phosphorescence, photoluminescence.

GD8. The Geology Of Diamonds

- The Earth and its geologic processes; diamonds in the Earth's mantle; diamond emplacement; diamond occurrences; resources and reserves of diamonds globally; "non-conventional" sources of diamond.

GD9. Diamond Mining And Extraction

- An explanation of preparation for diamond mining; mining primary deposits; mining secondary deposits; the recovery process for diamond.

GD10. The Diamond Pipeline

- The brief history of the major diamond mining companies; worldwide cutting centres; global polished diamond markets; a look at ethics, the environment, and best practices.

GD11. Rough Diamonds

- A brief overview of the sorting of rough diamonds; rough diamond shapes, qualities, and colour grades; an explanation of the yield achievable from rough to fashioned stones.

GD12. Diamond Manufacture And Quality Of Cut.

- The principles of polishing, tracking, and dividing; the use of table smoothing; the bruiting, faceting and polishing of a diamond; the use of lasers in diamond fashioning; a brief summary of the diamond cutting process.

GD13. Diamond Grading

- The idea of carat weight; the theory of colour grading; the theory of clarity grading; cut grading, both in terms of shape, and facet arrangement.

GD14. Diamond In Jewellery

- Diamond settings and styles; metal use in jewellery; the quality and value factors of jewellery; valuing diamonds in settings; handling of gemstone jewellery; testing of set diamonds; appraisals and valuations; diamond grading and gem identification reports.

GD15. Diamond Simulants

- The definition of a diamond simulant; introduction to simulants; natural materials used as diamond simulants; artificial materials used as diamond simulants; doublets and other composites; diamond-coated materials, observational features for determining simulants; testing tools for diamond identification; the properties of diamond and its simulants.

GD16. Synthetic Diamonds

- The brief history of synthetic diamonds; HPHT production methods and properties of HPHT synthetic diamonds; CVD production methods, and the properties of CVD synthetic diamonds; nano-polycrystalline diamonds; general properties of synthetic diamonds as opposed to natural diamonds

GD17. Diamond Treatments

- The brief history and development of treatments; surface treatments; methods for irradiation and subsequent annealing; HPHT treatments; laser drilling – standard and KM treatments; fracture-filling of diamonds.

GD18. Diamond Testing

- Observation and magnification – the use of non-laboratory testing; polarised light and strain patterns; the use of the electromagnetic spectrum in testing; SW and LW Ultra-violet; photoluminescence; introduction to the range of screening tools available; DiamondView, X-rays; UV-Vis/FTIR/Raman spectroscopy; synthetic and treated diamonds.

Practical syllabus

This contains fourteen loose polished stones: each diamond will have been pre-graded in London according to GIA and CIBJO grading systems. Answers must be given in either the GIA or the CIBJO systems. One stone will be viewed at a time. The examination requires diamond identification, colour grading, clarity grading, description of symmetry, proportions and girdle details, detection of treatments and detection (but not identification) of simulants.

One or more of the stones may be a treated diamond, or a diamond simulant, or an assembled stone. Colour and clarity grading of fracture-filled stones is not required. Both colour and clarity grading of laser-drilled stones is required.

If a candidate states that a diamond is a diamond simulant, or that a diamond simulant is a diamond, this is counted as a wrong identification. Any questions left unanswered will be marked as a wrong identification.

Students are required to carry out the following:

- Identification of diamond and distinction of diamond from its simulants. To identify diamond using 10x lens only. Simple tests to distinguish diamond from simulants. Identification of the simulant species is not required.
- Detection of diamond treatments: the detection of laser drill-holes made to improve the appearance of diamond inclusions. The detection of artificially- filled fractures

reaching the surface ('fracture-filled' diamonds).

- Cut grading: visual estimation of table symmetry and approximate table diameter percentage using the 10x lens and the 'bowing' method; crown angle by 'third of right angle' method; pavilion depth by 'ratio' method; estimation of 'fish-eye' and 'lumpy' extremes. Girdle width and condition.
- Colour grading: use of a folded white card and grading lamp, with or without colour comparison ('master') stones, to assess colour grade using the CIBJO/GIA system colour grades, down to grade 'Tinted/N".
- Clarity grading: use of the 10x lens (loupe), diamond tongs and grading lamp to assess the clarity grade using the CIBJO/GIA clarity system.

Further information

Other related documents available from Gem-A:

- Sample past papers.
- Exam reports.
- Annual prospectus which includes information on fees and examination dates.
- Gem-A's student handbook which includes information on:
  Reasonable adjustments and special considerations policy and procedures.
  Examination enquires and appeals .
  Malpractice procedures.
  Equal opportunities policy.

For these documents or further information relating to any of Gem-A's courses and examinations please contact education@gem-a.com or go to www.gem-a.com.