The Syllabus has been drawn within the parameters of the S.E.C. 29 Syllabus for Graphical Communication 2008 - 2010. It would be advisable to check the S.E.C. syllabus at the beginning of each year and include any revisions, which may have taken place.
Please note that
the Syllabi for Form 1 and Form 2
as shown below
have been replaced by a new curriculum
which can be accessed through the
Form 1 and Form 2 Curriculum pages.
Hereunder is the amended Graphical Communication Syllabus as agreed to by the subject teachers who attended the in-service course held in September 2006.

This syllabus, which is to be used in both the Junior Lyceums and Area Secondary Schools, reflects the new S.E.C. Examination for 2009-2010. Provisions for students who choose the subject in the third year as an option are being included.

C. SPITERI
Education officer
Design and Technology
AIMS AND OBJECTIVES

Amongst other aims the syllabus should:

- Contribute to the pupil's personal development and overall education.
- Develop the pupil's ability to interpret, reason and communicate graphically.
- Stimulate an interest in and enjoyment of the study of graphical techniques and their application.

Throughout the course the student is expected to be able to demonstrate

- Knowledge
- Comprehension
- Application
- Analysis
- Technique.

Knowledge of:

- Drawing equipment
- Constructions, terminology and conventions applicable to the subject.
- Principles of orthographic and pictorial projections.

Comprehension:

- Interpretation of the information given (verbally, in written form, graphically, or a combination of two or more), so as to represent design concepts.
- Consideration and representation of plane and solid shapes.
- Understanding and visualizing spatial relationships.

Application:

- Production of suitable drawings from information given.
- Application of the principles of plane and solid geometry to the solution of problems.
- Application of the principles of orthographic and pictorial projection.
Analysis:

- Comparison and use of the appropriate graphical methods of communicating information and ideas.
- Analysis of and solutions to a problem graphically.

Technique:

- Accuracy in questions answered.
- Ability to sketch freehand and in good proportions.
- Presentation of good draughtsmanship (presentation, cleanliness, finishing, spacing etc.)
- Use of available aids and media to enhance the presentation where appropriate.

Note:
Neatness, presentation and accuracy should be stressed regularly throughout the whole course. Technical terms and details should be used when encountered.
FORM 3

Note: As you are aware students may opt to start Graphical Communication in Form Three with the programme being covered in 3 years and in separate classes as is being done in the case of foreign languages. See appendix 1 at the end of syllabus.

Revision of Form 1 and 2 syllabii. Problems and exercises.

1 GEOMETRICAL CONSTRUCTION:

1.1 The circle
Circles touching; two and three circles touching; internal and external; tangential arcs.

1.2 Triangles
Construction of triangles from given data:
- Perimeter and the ratio of the 3 sides
- Perimeter and altitude of an isosceles triangle
- Perimeter and the 2 base angles
- Perimeter, base and base angle
- Base angle, apex angle and altitude

1.3 Tangents
To a point on the circumference. From a point outside the circle. Tangents to equal and unequal circles (external and internal tangents).

1.4 Polygons
General revision. Regular and irregular polygons drawn from given data.

1.5 Division of lines
Proportional division of lines. Its application in drawing figures (e.g. Triangle with sides 2:4:5-perimeter 200), etc.
1.6 Enlargement  
Linear enlargement and reduction of regular or irregular figures with straight lines only. Use of radial method to a given measurement or ratio (see 1.4).

1.7 The ellipse  
Construction of the ellipse. Five methods: Auxiliary circles or Concentric circles, Trammel, Intersecting lines or Rectangle, Intersecting arcs or Foci or Radial interceptors and Compasses or Approximate. Construction of circles and lines tangential to the ellipse.

2 ORTHOGRAPHIC PROJECTION:

2.1 Orthog. Proj.  
Further exercises regarding blocks with straight lines only and including horizontal, vertical and inclined lines/slopes, webs, ribs, etc. Blocks with hidden edges and with square or rectangular holes. Introducing curved lines, holes and centerlines. Introducing 3rd angle orthographic projection. Both projections should be used regularly. Introducing the projection of the third view from the given two elevations.

2.2 Sectioning  
Introducing simple whole sectioning. Section lines at 45° and equally spaced.
3 SOLID GEOMETRY:

3.1 Prisms  Square, rectangular, hexagonal, etc. truncated at different angles - including elevations, true shape of section and development. Truncation may be sectioned.

3.2 The Cylinder  Truncated at different angles and as 3.1

3.3 Pyramids  Square, rectangular, hexagonal, etc. truncated at different angles - including elevations, **true shape** of section and development. Introducing **true lengths**.

3.4 The Cone  Truncated at different angles and as 3.3.

3.5 Inclined  Prisms and cylinders standing inclined at an angle to one of the principal planes – to project the other two elevations.

4 PICTORIAL PROJECTION:

4.1 Isometric  Construction of isometric projections including circles and arcs by the use of a grid, ordinates and approximate (compasses) method.

4.2 Oblique  Cabinet with straight and curved lines.

5 GRAPHICS

5.1 Logos  Introduction to the three types of Logos: Monogram (letters), Design, and Combination of Monograms and Designs.

5.2 Ideograms  Harder examples and exercises
5.3 Graphs

Introduction to. Line, bar, pie, block, pictographs, percentage bar, etc. Keys / Legends and colour coding.
Revision - problems and exercises. **Emphasis on time management.**

1 **GEOMETRICAL CONSTRUCTION:**

1.1 **Enlargement**

Linear enlargement and reduction of figures having straight and curved lines. Different methods to be used - radial, pole, proportional and grids.

1.2 **Areas**

**Conversion** of areas. Polygon to quadrilateral, triangle, rectangle, square. Rectangle to rectangle. Rectangle to square, etc.

1.2 **Areas**

**Determination** of areas of regular or irregular figures bound by straight and curved lines. Both squares and parts of and mid-ordinate methods are to be used.

1.3 **Loci**

Loci of simple moving parts/mechanisms. Circular and reciprocating co-planar motion. Glissette, Cranks, Cycloids, Involute, Archimedes spiral and **Helix.**

1.4 **Helix**

To cover simple line helices with one or more revolutions. Its application. Springs (circular, rectangular or square). Handrails, etc. (threads not considered.)

1.5 **Scales**

Simple or plain scale and its application.
2 SOLID GEOMETRY:

2.1 Conic sections
The ellipse, the parabola and the hyperbola as conic sections and using the radial and sections method. Developments - radial method.

Projection of elevations from given developments.

2.2 Inclined
See Form 3: 3.5.

3 ORTHOGRAPHIC PROJECTION:

3.1 Assembly
Orthographic projection of assembled components from: in-line exploded pictorial projection, from orthographic views, and combination of.

3.2 Sectioning
Whole, half, part, staggered, removed, revolved.

3.3 Webs / Ribs
Parts and features of parts not normally sectioned. (i.e. Longitudinal cutting planes).
Webs, ribs, spokes, shafts and similar parts, cut/sectioned along their axis are not to be shown in section.
Parts and features of parts normally sectioned. (i.e. transversal cutting planes). Webs, ribs spokes, shafts, tubes and similar parts cut/sectioned across their axis are to be shown in section.

3.4 Conventions
Simple B.S. drawing conventions to represent components in engineering drawing and including dimensioning. Refer to PP 8888.
List of Conventions – annex C.
3.5 Free hand  Freehand sketching of orthographic views, with straight and curved lines, in good proportion.

4 PICTORIAL PROJECTION:

4.1 Planometric  Introduction to planometric projection. Horizontal axis of the object to be 45°/45° or 60°/30°. In the case of 45°/45° the height may be reduced depending on height of object. Including straight and curved lines.

4.2 Perspective  Introduction to perspective projection. Estimated only. Single-point and two points perspective. Shading.

Worked example of a two point Perspective view - annex D

4.3 Free hand  Freehand sketching of pictorial views with straight and curved lines in good proportion and either shaded or unshaded.

5 GRAPHICS:

5.1 Ideograms  Harder examples. Past papers

5.2 Logos  Harder examples. Past papers

5.3 Electricity  Introduction to electrical circuits.

List of Electrical/Electronic symbols – annex E.

5.4 Graphs  Harder examples. Past papers.

5.5 Flow Charts  Simple flow charts of practical nature with symbols for Terminals, Processes, Inputs / Outputs, Decisions and Connectors.
5.6 Computer Graphics
The use of computer as an aid to draughting. To follow a sequence of computer commands for creating graphic images on a pre-printed grid and draw images produced by a given programme. *Specimen question/answer – annex F.*

5.7 Design.
Design in relation to graphical presentation. To find and draw a solution to a given simple problem in design. See specimen paper S. E. C. 2002 -2005 syllabus.
FORM 5

Revision as in previous years with emphasis on time management.

1 GEOMETRICAL CONSTRUCTIONS:

1.1 Scales
Revision of the simple scale and introduction to diagonal scales.

1.2 Vectors
Simple vectors. Triangle and polygon of forces. Co-planer and concurrent only.

2 SOLID GEOMETRY:

2.1 Interpenetration
Interpenetration of solids. Lines of intersections, between prisms and cylinders, equal and unequal in diameter. Interpenetrations to be restricted to solids whose axes are perpendicular. These axes may either lie in the same vertical plane or offset, but always parallel to the vertical plane. Developments.

3 ORTHOGRAPHIC PROJECTION:

3.1 Auxiliary
Auxiliary views of simple objects. Auxiliary plan and auxiliary elevation. Given auxiliary elevation and plan to draw the front and side elevations.

3.2 Lines
Lines in space. Finding their true length by rotation or auxiliary projection. Lines to be drawn in isometric in relation to the vertical and horizontal planes.
4 GRAPHICS:

4.1 Ideograms Harder examples. Past papers.

4.2 Logos Harder examples. Past papers.

4.3 Electricity Harder examples. Past papers.

4.4 Computer Graphics Harder examples.

4.5 Charts Sequence of work. (as in Do-it-Yourself Kits)

4.6 Design See Form 4 : 5.7.

Revision of work through past papers with emphasis on accuracy, presentation and time management.
APPENDIX 1

GRAPHICAL COMMUNICATION - Taken as a third-year option.

FORM 3 year 1

1 THE EQUIPMENT:

1.1 Pencils
Types of pencils, common and clutch. Codes used on pencils (6H----H  HB  B---6B). Pencils used in the subject. Sharpening of pencils. Pencil point should always be sharp for accuracy, neatness and presentation.

1.2 Erasers
Types of. Synthetic and natural rubber, soft and hard.

1.3 Rulers
Common types: wooden, plastic (metal should not be used). Attention when measuring to avoid errors.

1.4 Paper
Types of: Grading by weight and surface finish. Common metric sizes: A sizes.

1.5 Drawing boards
Types of boards: wooden or plastic used by students and drafting machines used in drawing offices. Sizes.

1.6 Board clips
Their use and alternatives. Drafting tape or sellotape, pins, other fasteners.

1.7 Tee-square
Wooden or plastic. Fixed or adjustable. Sizes.
1.8 Set squares
Types of. Material - sizes - names (30° / 60° and 45°). Safe use. Students should be taught how to handle and use the set squares. How to draw angles with one or two set squares (30° and 45° = 75°).

1.9 The protractor
Proper use of. Inside and outside reading. Right- and left-handed reading. Reading of angles on perpendicular, vertical and inclined bases.

1.10 Compasses
Types: Spring, small, wheel operated, etc. Emphasis on having good quality instruments. Two compasses with one for small circles, should be encouraged. Safe use of these instruments.

1.11 Dividers
Use of. Safe and proper handling of.

1.12 Other equipment
Drawing aids: French curves, flexi curve, radius curves, templates, others. They should not be encouraged at this stage - should be mentioned for general knowledge - can be used later on after acquiring drafting skills.

2 DRAWING TECHNIQUES:

2.1 Lines
Types of: Outlines - bold and dark - H pencil or an HB. Construction / projection / dimension lines - thin and faint (feint)-2H pencil. Emphasis on difference. The other types of lines will be dealt with as they come along.
2.2 Borders  
Borderlines and title block / panel. All necessary information to be included when appropriate: Name, class date, drawing number, scale and projection.

2.3 Lettering  
Simple block lettering. Freehand and between guidelines for uniformity (note that 3mm to 5mm is ideal height). Lettering should be checked regularly. Do not encourage stencils or dry transfers.

2.4 Measuring out  
Proper method of measuring out with the use of the dividers and ruler. Discourage direct transfer of measurement from the ruler to the drawing.

3 GEOMETRICAL CONSTRUCTION:

3.1 Bisection.  
Bisection of horizontal, vertical and inclined lines using the compasses. Multiple bisections: 4, 8, etc. Attention should be drawn to the fact that a perpendicular (90°) is produced.

3.2 Perpendiculars  
Erection from a central point on a line. Erection from a point near the edge of a line. Dropping a perpendicular from a point above the line Erection of a perpendicular to one end of the line. The line can be in a vertical, horizontal or inclined position.

3.3 Division of lines  
Divide a line into a number of equal parts. Use of set squares, compasses and dividers. Accuracy emphasized. Practising parallel lines with the use of set squares. Division of straight lines to a given ratio. Its application in drawing figures.
3.4 Angles  Right angle, acute, obtuse and reflex. *Construction* of angles with the use of set squares ($30^\circ + 45^\circ = 75^\circ$) protractor and/or compasses. *Bisection* of angles by means of set squares and compasses.


3.6 Quadrilaterals  Types of: square, rectangle, parallelogram, rhombus, trapezium, kite, etc. Their properties. Their construction.


3.8 The Octagon  Its construction in a circle and in a square.

3.9 The Hexagon  Construction by means of: Set squares and Tee square: Inscribed in a circle using the compasses: Inscribed in a circle using the $60^\circ$ set square. Circumscribed around a circle using the set squares, etc.

3.10 The Pentagon  Construction of the pentagon and heptagon by means of the protractor.

3.11 Polygons  Construction of regular polygons in a given circle. Construction of regular polygons on a given line (one side given).
3.12 The Circle

Parts of the circle: circumference, radius, sector, quadrant, diameter, centre, segment, chord, arc, semi circle, etc. Problems related to the circle. Finding the centre of a circle. Circles inscribed in triangles, squares and polygons. Circumscribed circles. Escribed circles. Tangents: To a point on the circumference. From a point outside the circle. Tangents to equal and unequal circles (external and internal tangents). Circles touching: two or more circles touching internally / externally and their combination - tangential arcs.

3.13 Enlargement

Linear enlargement and reduction of regular or irregular figures with straight lines. Use of radial method to a given measurement or ratio (see also 3.3).

3.14 Application

Application of the above geometrical constructions in practical examples.

4 ORTHOGRAPHIC PROJECTION:

4.1 Orth. Proj.

Introduction to orthographic projection. 1st angle and 3rd angle orthographic projection. Both projections should be used regularly. Projection with straight lines and including vertical, horizontal and inclined lines. End elevation to be drawn on either side of the front elevation (can also be drawn on both sides of the front).
4.2 Hidden details

Blocks with hidden edges (dotted lines) drawn according to the B.S., slots and square/rectangular holes. Introducing curved lines, holes and centrelines.

4.3 Sectioning

Introducing simple whole sectioning. Section lines at 45° and equally spaced.

Specimen example of a Name/Title Block – annex A.

4.4 Free-hand

Free-hand sketches of elevations on squared (grid) paper. Several examples can be given where two views are given and the third is to be added. Enlargement of figures / drawings using grids.

5 SOLID GEOMETRY:

5.1 Prisms

Square, rectangular, hexagonal, etc. truncated at different angles and including elevations. True shape of section and development (fold lines). Truncation may be sectioned.

5.2 The Cylinder

Truncated at different angles and as in 5.1

5.3 Pyramids

Square, rectangular, hexagonal, etc. truncated at different angles and including: elevations, true shape of section and development. Introducing true lengths.

5.4 The Cone

Truncated at different angles and as in 5.3.

5.5 Inclined

Prisms and cylinders standing inclined at an angle to one of the principal planes. To project side elevation and plan.
6 PICTORIAL PROJECTION:

6.1 Isometric Projection  
Introduction. Straight lines, including vertical, horizontal and inclined. To be drawn from given isometric, oblique and simple orthographic views. Curved lines including circles, arcs and cylinders. Use of grid, ordinates and approximate (compasses) method.

6.2 Oblique Projection  
Introduction. Similar to 6.1. To be in CABINET form with the 3rd axis at 45° and half true length. CAVALIER oblique to be mentioned for general knowledge only.
1 GEOMETRICAL CONSTRUCTION:

1.1 The Ellipse
Construction of the ellipse. Five methods - Auxiliary circles or Concentric circles, Trammel, Intersecting lines or Rectangle, Intersecting arcs or Foci or Radial interceptors and Compasses or Approximate. Construction of lines and circles tangential to the ellipse.

1.2 Loci
Loci of simple moving parts/mechanisms. Circular and reciprocating co-planar motion. Glissette, Cranks, Cycloids, Involute, Archimedean spiral and Helix.

1.3 Helix
To cover simple line helices with one or more revolutions. Its applications such as Springs - circular, rectangular or square. Other applications (threads not considered).

1.4 Scales
Simple or plain scale. Its application.

1.5 Enlargement
Linear enlargement and reduction of figures having straight and curved lines. Different methods to be used: radial, pole, proportional, etc.

1.6 Areas
Conversion of areas. Polygon to quadrilateral, triangle, rectangle, square. Rectangle to rectangle. Rectangle to square etc.
1.7 Areas  Determination of areas of regular or irregular figures bound by straight and curved lines. Both methods - squares and parts of - and mid-ordinate, methods are to be used.

2  SOLID GEOMETRY:

2.1 Conic sections  The ellipse, the parabola and the hyperbola as conic sections and using radial and sections method. Developments - radial method. Projection of elevations from given developments.

2.2 Inclined  See Form 3 Year 1: 5.5

3  ORTHOGRAPHIC PROJECTION:

3.1 Assembly  Orthographic projection of assembled components from: in line exploded pictorial projection. From orthographic views and combination of.

3.2 Sectioning  Whole, half, part, staggered, removed, revolved.

3.3 Webs / Ribs  Parts and features of parts not normally sectioned. (i.e. longitudinal cutting planes). Webs, ribs, spokes, shafts and similar parts, cut/sectioned along their axis are not to be shown in section.

Parts and features of parts normally sectioned. (i.e. transversal cutting planes). Webs, ribs, spokes, shafts and similar parts sectioned across their axis are to be shown in section.
3.4 Conventions
Simple B.S. drawing conventions to represent components in engineering drawing. Dimensioning included. Refer to PP8888.

List of commonly used Conventions – annex C.

3.5 Free-hand
Free-hand sketching of orthographic views with straight and curved lines in good proportion.

4 PICTORIAL PROJECTION:

4.1 Planometric
Introduction to planometric projection. Horizontal axis of the object to be 45°/45° or 60°/30°. In the case of 45°/45° the height may be reduced, depending on height of object. Including straight and curved lines.

4.2 Perspective
Introduction to perspective projection. Estimated only. Single point and two points perspective. Shading.

4.3 Free hand
Free-hand sketching of pictorial views with straight and curved lines in good proportion and either shaded or unshaded.

5 GRAPHICS:

5.1 Ideograms
Introduction and examples of.

List of safety signs – annex E.

5.2 Logos
Introduction and examples of.

5.3 Electricity
Introduction to electrical circuits and examples of.

List of Electrical/Electronic symbols – annex E.
5.4 Graphs
Line, block, pie, pictograms, etc.

5.5 Flow Charts
Simple Flow Charts of practical nature. Symbols used - terminals, process, input/output, decisions and connectors.

5.6 Computer Graphics
The use of computer as an aid to draughting. To follow a sequence of computer commands for creating graphic images on a pre-printed grid and draw images produced by a given programme.
Specimen question/answer – annex F.

5.7 Design
Design in relation to graphical presentation. To find and draw a solution to a given simple problem in design. See specimen paper SEC 2002 -2005 syllabus.

THE SYLLABUS FOR FORM 5 REMAINS THE SAME.
Specimen example of Title/Name Block

annex A
List of Safety signs

Key to British and European Standard Safety Signs

The principles of colour and design for the different types of safety sign adopted by BS5378

PROHIBITION SIGNS

All prohibition signs are red and white. These signs contain a red circle with a diagonal line through it, and the lettering is white upon a red background mounted on white.
WARNING SIGNS

All warning signs are based upon the colours black and yellow, with the main instruction always being printed in black on a yellow background.
MANDATORY SIGNS

All mandatory signs are based upon a blue background with white instructions.
SAFE CONDITION SIGNS

All safe condition signs have a green background with the instruction always in white.
CONVENTIONAL REPRESENTATIONS

- Conventional break lines for solid shaft
- Conventional break lines for hollow shaft (Tube)
- Rectangular section
- Symmetrical either side of centre line
- Wood
- Concrete
- Liquid - water
- Glass

Flat portion on a Shaft
Limits of partial or interrupted views and sections, if the limit is not an axis
To draw a crate in estimated perspective

- draw a horizontal line joining V.P. to V.P.; thus finding eye level;
- mark actual width and length of the object on the horizontal lines OP and OQ;
- draw two perpendicular lines P, P' and Q, Q' on the eye level line;
- join distance P, Q' to locate mid-point R;
- join R to P and R to Q to obtain the foreshortened length OS and width OT;
- then OT represents the perspective length of the crate while OS represents the perspective width of the crate;
- mark actual height of the object OH;
- complete the crate by projecting the lines to the given VP's.
PROPORTIONAL SCALES:

To obtain the widths of the component:
- draw the diagonal OC;
- with O as centre and OH as radius, draw arc to intersect the line O, VP at V;
- join V to P;

To obtain the 30mm width:
- mark O-W horizontally 30mm long;
- with centre O and OY as radius draw an arc to obtain Z;
- join Z to VP to intersect the diagonal OC at A;
- then OB is representing the foreshortened 30mm width.

NOTE: repeat the same procedure to obtain the other widths.

To obtain the lengths of the component:
- draw the diagonal OD;
- with O as centre and OH as radius (height of object);
- draw arc to intersect the line O, VP at J;
- join J to Q;

To obtain the 40mm length:
- mark O-K horizontally 40mm long;
- draw KL parallel to JQ;
- with centre O and OL as radius draw an arc to obtain M;
- join M to VP to intersect the diagonal OD at N;
- then OU is representing the foreshortened 40mm length.

NOTE: repeat the same procedure to obtain the other lengths.
Estimated Two Point Perspective View

PROPORTIONAL SCALES: Same principle, alternative method.

To obtain the widths of the component:

- Widths:
  - \(60\text{mm} \) (Height)
  - \(30\text{mm} \)
  - \(80\text{mm} \) (Width)
  - \(20\text{mm} \)

To obtain the lengths of the component:

- Lengths:
  - \(60\text{mm} \) (Height)
  - \(40\text{mm} \)
  - \(120\text{mm} \) (Length)
  - \(35\text{mm} \)

Observer’s Position:
- \( \text{Q} \)

Object’s Position:
- \( \text{P} \)

Ground Level:
- \( \text{O} \)

Width of object = \(80\text{mm} \)

Length of object = \(120\text{mm} \)
The following is a selection of symbols used in electrical / electronic circuit diagrams according to B.S.I. Publication BS 3939 EN 60617.
A computer graphic programme uses the instructions DATA, MOVE & DRAW to generate an image in the following way

DATA: A = 300: B = 400: C = 500: D = 600: E = 700: F = 800: G = 900:

ACI 4: MOVE A,D: DRAW D,A: DRAW C,D:
MOVE E,D: DRAW D,A: DRAW G,D: DRAW A,D:

ACI 2: MOVE A,D: DRAW B,E: DRAW C,D: DRAW D,E:
DRAW E,D: DRAW F,E: DRAW G,D:

ACI 3: MOVE B,E: DRAW F,E:

The DATA statement specifies the numeric values (in pixels) of given variables.
MOVE positions the cursor at the given location without drawing a line. DRAW draws a line from the current location given by the variable. The instruction ACI (AutoCAD Colour Index Number) will change those images that follow the instruction into a colour that is given by the number.

The computer responds to the following colour commands:

<table>
<thead>
<tr>
<th>(ACI) Colour Index Number</th>
<th>Colour</th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Yellow</td>
</tr>
<tr>
<td>3</td>
<td>Green</td>
</tr>
<tr>
<td>4</td>
<td>Blue</td>
</tr>
</tbody>
</table>

The above programme has been written in response to a design brief requiring a trade symbol for a new Jewellery company called Diamonds. The starter sheet provided shows a pre-printed grid which represents the graphical display (1200 x 1200). Use the grid to draw the image produced by the above programme.