National Council for Curriculum and Assessment
An Chomhairle Náisiúnta Curaclaim agus Measúnachta

Leaving Certificate

Design and Communication Graphics

Ordinary level & Higher level

Draft Guidelines for Teachers

Draft 1 – November 2006

Preamble

These draft guidelines are being made available to support the implementation of Leaving Certificate Design and Communication Graphics. They are available for download from the NCCA website www.ncca.ie (see Publications/Draft Syllabuses and Guidelines).

As the programme of support for teachers develops and as dedicated resource materials for teaching and learning be come available, the guidelines will be updated to reflect these developments. The experiences of teachers in the initial phase of implementation will also contribute to an updating of the guidelines. When completed, the final draft of these guidelines will be printed and circulated to teachers and schools.

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1 Introduction

1.1 Preamble

Leaving Certificate programmes place particular emphasis on the preparation of students for the requirements of further education or training, for employment and for their role as participative, enterprising citizens. The syllabuses for Leaving Certificate emphasise the importance of a spirit of inquiry, critical thinking, problem-solving, self-reliance, initiative, enterprise and gender equity. This syllabus has been prepared in the light of and in answer to these emphases. The syllabus for Design and Communication Graphics has been developed to replace the syllabus for Technical Drawing. It builds on that syllabus and seeks to introduce contemporary communication methods such as computer-aided design and modelling(CAD).

1.2 Relevance of Design and Communication Graphics

Information can often be best communicated in graphical form, whether as graphs, charts or portfolio drawings. Good design enhances life and needs to be communicated effectively and efficiently. The inclusion of Design and Communication Graphics as a subject in the second level education curriculum contributes to society's increasing awareness and appreciation of the benefits of good design. These, in turn, are giving rise to demands for better aesthetic as well as better functional performance. Well designed physical infrastructure, art and artefacts contribute significantly to the population's general well-being. The family of technological subjects, including Design and Communication Graphics, raises the level of innovation, which is essential to social economic well-being.

Design and Communication Graphics provides knowledge of the evolution and critical appreciation of design which enables students to contribute innovative answers to societal, commercial and industrial needs, and prepares them for further study. It equips them with the skills to solve interdisciplinary and cross-disciplinary problems and to communicate design solutions through a medium which is not language-dependent. It endows them with self-confidence to participate as full citizens and to avail of career opportunities, and it gives them a foundation for further formal study and self-directed learning

Design and Communication Graphics provides a means of communication, which by its very nature is international, transcending the barriers associated with verbal languages. Design and Communication Graphics provides students with a broad range of skills that will enable them to participate in a rapidly changing technological society. Design

and Communication Graphics will equip students with the skills and information that are necessary to define and solve problems creatively and to communicate solutions gaphically.

Students are encouraged to illustrate the solution to both concrete and abstract problems by various means, for example sketching and CAD. The study of Design and Communication Graphics will enhance the student's graphical and communication skills.

The investigation of the design of artefacts provides students with an appreciation of the aesthetic worth of objects. Students are encouraged to model artefacts using drawing equipment, freehand sketching and CAD.

1.3 Participation

The relatively low participation of girls in Leaving Certificate Technical Drawing was considered during the development of the syllabus, and great effort has been made at all stages to ensure that the content and methodologies will equally encourage the participation of both boys and girls. Schools should encourage the inclusive participation of both genders in this subject to reflect their participation in the wider working environment.

Where appropriate, reasonable accommodation should be put in place to provide for students with special educational needs, consistent with the school's special educational needs policy, the school's health and safety statement and the State Examinations Commission's policy on the matter.

1.4 Aims of Design and Communication Graphics

This subject aims to

1) develop the cognitive and practical skills associated with communication graphics, problem solving and critical thinking
2) develop the capacity and ability of students in the area of visuo-spatial reasoning
3) provide a learning environment where students can plan, organise and present appropriate design solutions using a variety of skills, techniques and media
4) develop an appreciation for, and understanding of, aesthetic principles and their importance in design and the human environment
5) provide a basis for lifelong learning

1.5 Role and aims of the guidelines

These guidelines are designed to support teachers of Leaving Certificate Design and Communication Graphics in planning and designing the learning experiences for their students, in assessing and evaluating those experiences and in guiding the students as they prepare for the Leaving Certificate examination.

It is vital that these guidelines are used in conjunction with the syllabus. Teachers should check the syllabus for differentiation between Higher and Ordinary level material.

As with all teacher guidelines prepared by the National Council for Curriculum and Assessment, these guidelines are published initially in draft form. As teachers engage with the syllabus and introduce it to students, and as students work with the topics and outcomes, the guidelines may need to be developed further to provide additional support. In that sense, the guidelines are always an unfinished project. They will develop as the professional insights of teachers working with the syllabus in classrooms are included. This is particularly the case for a subject like Design and Communication Graphics, which includes a student assignment for the first time.

The guidelines are intended to provide an overview of the nature of the subject and suggest the type of teaching and assessment to be employed in the subject.

The professional development programme that is put in place to support the implementation of this syllabus will complement these guidelines, and will provide specific detail on content and sample assessment materials. In the course of this programme of teacher professional development, resources for teaching and learning will be developed. Reference to such resources will be incorporated into a subsequent draft of these guidelines.

2 The syllabus

2.1 The structure of the syllabus

The syllabus is divided into 2 sections, the core areas of study and the optional areas of study. The core area is further divided into two sections, plane and descriptive geometry and communication of Design and Computer graphics. Much of the content of areas of study is common to both higher and ordinary level, however the depth of treatment required at each level differs significantly. Syllabus material which is designated for higher level only is shown in black. It is envisaged that the subject will be timetabled for 180 hours. The components of each section are shown in Fig 1.

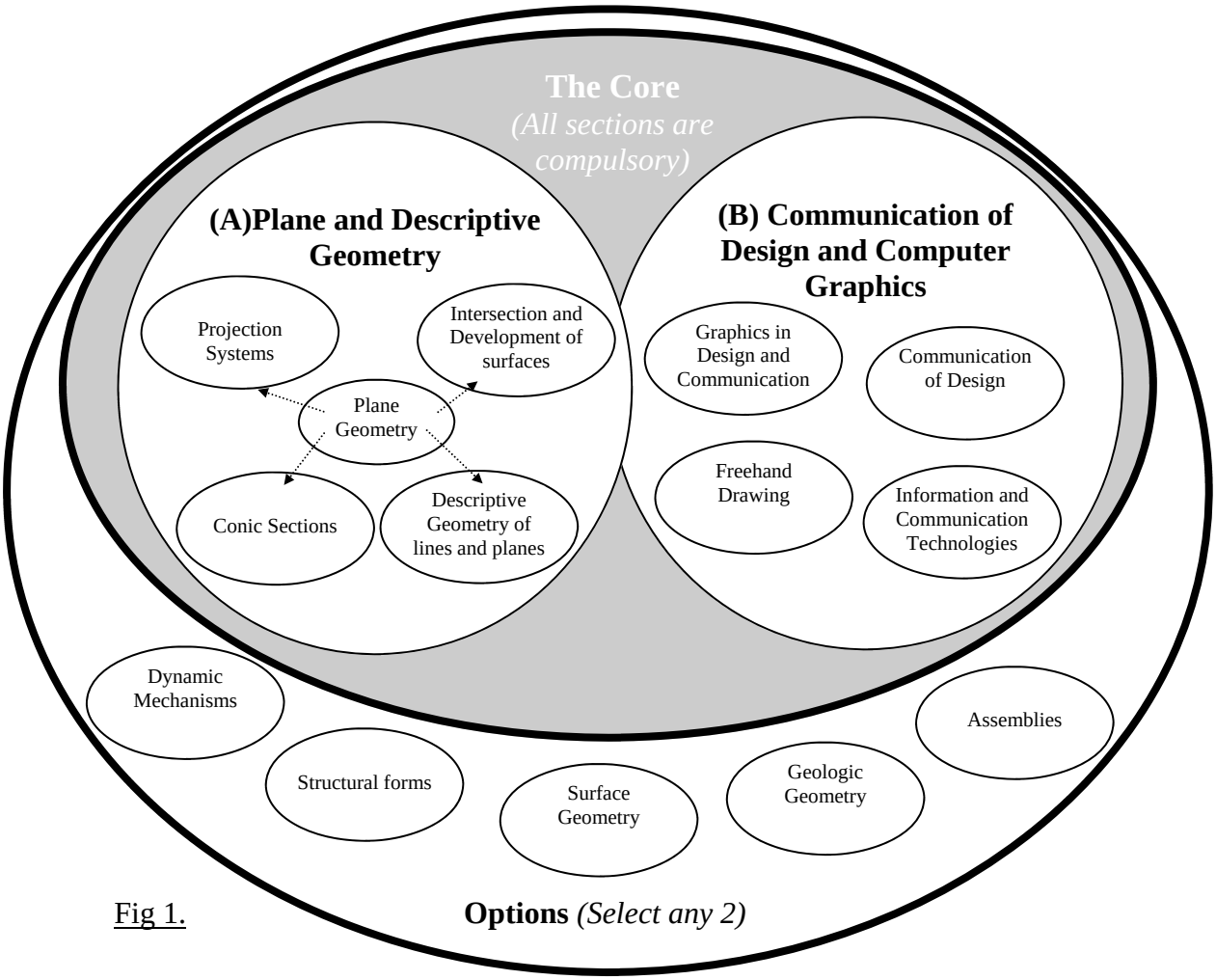

Fig 1.

The Core

The core is the basis of the subject comprising all the key elements of Design and Communication Graphics it is intended to give the students a thorough understanding of the principles of plane and descriptive geometry and the communication of design and computer graphics, as illustrated in Fig. 1. There is no hierarchy amongst the elements of the core and there is no designated order in which the elements are to be taught. Indeed it is felt that a holistic approach to the teaching of the core would be most advantageous. It should be noted that plane geometry should underpin the other topics in the core rather than be seen as a distinct topic. Links should be established where possible between each of the elements of the core.

The options

The options are **five** distinct areas of design and communication graphics each with a basis in the core providing the student with the opportunity to study particular aspects of the course in more detail. Students must choose **two** areas from the options and will then attempt these options in the terminal examination. It is not envisaged that each option will be taught in each class group rather that a decision will be taken by the teacher having due regard to the students in the class and their particular abilities.

2.2 Nature of the subject

Design and communication Graphics is an activity based subject and as such challenges students to produce graphic illustrations to the solution of problems and to communicate graphically using the media of freehand sketching, CAD and manual draughting techniques. Design and Communication Graphics seeks to develop the visuo-spatial reasoning, problem solving, logical thinking, practical thinking and communication skills of students. Design and Communication Graphics utilises both traditional and contemporary methods of graphical communication and thus envisages that students will have one-to-one access to both computer and manual draughting facilities.

The underlying principles of plane and descriptive geometry are at the core of this subject and these principles are enhanced and underpinned through the investigation and communication of design.

Design and Communication Graphics seeks to build on the strengths of its predecessor Technical Drawing, which had a strong reliance on the underlying principles of plane and solid geometry. Students should be continually encouraged to communicate their ideas through the media of freehand sketching and CAD throughout the course and not just for the production of the student assignment.

The integration of topics and the interconnection between the elements of the core is a key emphasis.

Differentiation between Ordinary level and Higher level

There are three main differences between Ordinary level and Higher level:

1. **Depth and style of treatment***:* Ordinary level encompasses a moderate range of theoretical and practical material. Higher level involves a deeper and more analytical treatment of this material.
2. **Skills development:** All students will be required to attain a wide range of cognitive and practical skills. A more refined expression of these skills will be required at Higher level.
3. **Range of syllabus material:** In addition to the syllabus content required at Ordinary level, Higher level students will be required to study a broader range of subject matter. Elements designated for Higher level only are printed in black text throughout the syllabus.

2.3 Assessment

Assessment will be in the form of **one terminal examination paper** and a **student assignment** which the students will complete in their final year of the course. The purpose of the assignment is to provide a medium through which students can display their understanding of the communication of design. The assignment will focus on areas of the subject which cannot be readily assessed in a terminal examination, for example, freehand sketching and CAD.

The terminal examination will allow students to demonstrate their problem solving skills and to convey their knowledge and understanding of the underlying principles involved in plane and descriptive geometry. The structure of the examination paper will reflect the syllabus structure – a compulsory core and an options section from which the students will attempt two distinct areas.

The terminal examination will be allocated 60% of the marks and the student assignment (of which CAD will form a significant and compulsory component) will be allocated 40% of the total marks for the subject.

3 Syllabus Content

3.1 What is new?

There has been a considerable change in content and the method of delivery of content. CAD and freehand sketching are compulsory components of the subject and students will be examined in these two areas. Graphic communication (including communication of design) is now firmly at the core of this syllabus and will also be examined in the form of the student assignment. Axonometric projection, which is introduced in the corresponding syllabus at Junior Certificate level, is now a part of the core for Design and Communication Graphics.

3.2 What has been removed from the Technical Drawing syllabus?

While some material has been removed there has been a considerable adjustment and relocation of essential areas of study, hence reducing the amount of content that a student must study and this must be viewed in two ways:

(a) material that has been removed from the area of plane and solid geometry (which was previously examined as paper 1) and material which has been removed from the application papers;

(b) The fact that students are expected to study only two areas from the options automatically eliminates areas by comparison with the previous syllabus.

Material which has been removed from the core includes

- area division and area conversion
- conjugate diameters from conic sections.

The treatment of areas such as perspective projection and shadows will not be as comprehensive as in the previous syllabus.

3.3 Content Presentation

The syllabus content is detailed under the following headings (a) areas to be studied and (b) the learning outcomes. The areas to be studied are presented for each section of the syllabus and give the general principles to be taught, whilst the learning outcomes specify what the students should be able to do on completion of their study of the topic. As mentioned previously areas which are in black text are for higher level only. There is not a direct correlation between each learning outcome and individual areas to be studied but, in general, each learning outcome can be associated with one or more of the areas to be studied.

It is important therefore that the topics to be studied and the learning outcomes be seen as connected items rather than as distinct portions of the syllabus. It is also important that cognisance be taken of which parts of the syllabus are designated for Higher level only and this should be made clear to students as they progress in their studies.

An example of how the areas to be studied and the associated learning outcomes could be connected is shown below (based on the syllabus section Communication of Design and Computer Graphics). In this table, learning outcomes that are Higher level only are shown in italics. The linkages between all areas to be studied and the learning outcomes are shown in appendix 1.

			Areas to be studied	**Examples of learning outcome**
Communication of Design and Computer Graphics	Graphics in Design and Communication		Drawing from a historical perspective	Compare traditional graphic communication methods with electronic methods and appreciate the advantages and disadvantages of both
			Design strategies	Display a knowledge of the rudiments of good design - proportion, colour, materials, ergonomics, safety and value for money
			Reflection on processes of design	Understand the steps required to bring a project from situation/brief, to final working drawings
			Design appraisal	Analyse design as it affects the function, ergonomics and aesthetic qualities of everyday artefacts
			Generation of design briefs	Evaluate design with reference to function, ergonomics and aesthetic qualities
				Generate design briefs appropriate to given problems
			Interpretation of design briefs	Interpret and analyse given design briefs
			Ideas sketching	Use freehand sketching as a tool to explain an idea
			Design problem solving	Understand the principles of the interpretation of graphic instructions as they apply to the solution of a design brief
			Design communication	Produce drawings, which can be used by a third party, to produce an artefact
	Communication of Design		Drawing conventions, symbols and standards	Use graphical symbols as necessary to convey a design to the correct drawing standards
			Presentation methods and layout	Create drawings and layouts that make appropriate use of materials available to achieve a pleasing presentation
			Design drawings and associated processes	Produce drawings, which can be used by a third party, to produce an artefact
			Pictorial and orthographic working and assembly drawings	Use graphics, both orthographic and three dimensional to explain design function and methods of assembly
			Balloon extraction detailing	Use standards pertaining to dimensioning and notation
			Exploded pictorial views	Produce drawings, which can be used by a third party, to produce an artefact
			Dimensioning and notation	Use standards pertaining to dimensioning and notation
			Schematic diagrams	Design schematic diagrams to explain familiar operations
	Freehand Drawing		Materials for freehand drawing	Use various methods of rendering and colouring to enhance a drawing
			Observation techniques	Identify the surfaces of an object relative to each other in three dimensional space
			Representing shape, form, texture and material	Select the most suitable medium for producing and rendering sketches and drawings
			Light and shade	Use various methods of rendering and colouring to enhance a drawing

			Areas to be studied	Examples of learning outcome
Information and Communication Technologies				Represent graphically the effects light and shade have on surfaces
			Design sketching	Use freehand sketching as a tool to explain an idea
			Freehand detailing	Produce freehand drawings
			The use of colour	Analyse critically the texture and colour of a surface and choose suitable rendering media by which the surface can be accurately represented
	(a) CAD applications		File management	Create folders and save files to designated locations using recognised naming conventions
			Graphics and CAD terminology	Appreciate the power of contemporary hardware and software as they apply to design and communication of design
			Graphics and CAD software	Use the various computer input and output devices as they relate to CAD
				Use CAD drawings to produce three-dimesional CAD models Use CAD modelling to explore geometric concepts and principles
			Generate working drawings from part and assembly models	Generate multi-view drawings from 3D models
			CAD sketching principles	Understand the impact of design intent in CAD modelling Realise in the CAD model the design intent
			Creating 3D assemblies	Produce exploded and assembled presentation drawings
			Generation of presentation drawings from parametric models	Generate multi-view drawings from 3D models
			Generation of exploded views and animated sequences from parametric models	Produce exploded and assembled presentation drawings Animate sequences
			Modelling and editing	Effectively use the editing features of CAD software
			Use of templates and libraries	Efficently use the standard tools and manipulation features of CAD software
			Data exchange between applications	Exchange data between applications Import and export files
			Graphic output	Produce presentation drawings from CAD models
	(b) ICT and Graphics		File management and organisation	Create folders and save files to designated locations using recognised naming conventions
			File formats and extensions	Use and understand the various file formats and images associated with CAD and related ICT software
			Image transfer	Transfer images from CAD software to ICT packages as an aid to compiling a document, making a presentation (copy/paste) or producing a photo-real representation of a model (export/insert, render to file) Convert an image from one format to another Capture images using a range of media (for example: digital cameras, scanners, screen capture, Internet, other)
			Image processing, transfer and manipulation	Manipulate images to achieve special effects
			Web research	Use the Internet as a research tool
				Download text and images from the Internet for analysis, editing and reproduction in a DTP package
			Presentation techniques using ICT and CAD software	Make slides with a CAD package of key steps involved in creating a drawing
				Use slides or other animation techniques to illustrate graphic design solutions

4 Teaching Methodology

Design and Communication Graphics offers students the chance to explore challenging concepts in a practical and applied fashion. At the heart of the subject are key concepts and building blocks which the student must engage with before embarking on further study of the subject. These concepts involve use of the manual drawing equipment, CAD and other ICT software, and the development of sketching skills, ICT skills, and a knowledge of the underlying principles and theorems of plane and descriptive geometry. In planning for teaching it is necessary to ensure that these basics have been covered and that the subject is subsequently taught in an integrated fashion.

There are certain areas of the core which underpin the study of other areas; for example, the study of oblique planes and auxiliary projection could be undertaken before embarking on a detailed study of intersection of surfaces. Planning for the sequencing of topics is therefore a key aspect of teaching Design and Communication Graphics.

Sketching is now a key area of the subject and as such should be encouraged from an early stage to ensure that students are equipped with the necessary skills to confidently and competently approach their assignment. Students should be encouraged to sketch the solution to a problem as they engage with it. Students should also be encouraged to sketch the 3-dimensional solution to problems as a key to understanding the portrayal of the 2-dimensional solution.

Due to the graphic nature of the subject presentation of course material is a key component in the teaching of the subject. The use of multimedia presentations using an overhead projector and data projector should play a key role and this must be considered when equipping the room.

Having established the core areas of a topic it would be advantageous to utilise worksheets in order to efficiently progress learning. On a worksheet the initial set-up has been done and the student can focus on the new knowledge immediately. This would be of benefit in areas such as projection systems where the worksheet could contain the plan and elevation and the student is required to complete the auxiliary view. This approach can be taken for almost all areas of the subject.

The linkages between areas of the subject must play a part in the teaching and learning, and the links between various topics should be established. Students dealing with equidistant loci should not simply know how they can be used as a problem solving tool but should be encouraged to establish links between them and conic sections, e.g. the locus of a point equidistant from two circles of unequal radii is a hyperbola based on focal distances.

The link between areas of the subject and objects and artefacts in the student's environment should be established e.g. conics and satellite systems.

The use of models to illustrate concepts and principles is to be encouraged as they provide an invaluable resource for teaching the subject. These may be physical models or computer generated models to improve the students understanding.

Students should also be encouraged to employ their knowledge of such areas as development of surfaces to model solutions to topics such as oblique planes and intersection of surfaces.

The student assignment provides a means for students to express their creativity, to demonstrate their knowledge of CAD systems, freehand sketching and the graphics of Design and Communication. It is essential that students are encouraged to sketch and portray artefacts so that they gain an understanding of their shape and form, and then encouraged to sketch modifications to their design. The development of the capacity for design and sketching must be considered at the beginning of the course and progressed over the duration of the course.

4.1 Key emphases

- **The establishment of the core principles of plane and descriptive geometry.** The key concepts and principles of geometry must be established before the students can embark on the more detailed treatment of topics such as oblique planes and dynamic mechanisms.
- **The utilisation of sketching and CAD as design and communication tools.** The development of sketching skills is an essential element of this subject. Sketching should be used to enhance problem solving skills in tandem with presenting information and designing. Throughout the course the students should be encouraged to illustrate their thinking and problem solving through the medium

of sketching. In a rapidly changing society it is incumbent on a technological subject to avail of computer based methods of graphical communications. To this end CAD and the use of ICT are important components of the subject. As with freehand sketching students should be introduced to the principles of CAD at an early stage in the course and receive continuous exposure and access to the use of CAD for the duration of the course.

- **The connections between topics.** The syllabus has been designed to be taught as a series of linked items and not as a series of parts. Where possible, the connection between various elements should be established. The linkages should be developed between topics of the core, between the core and the options and between the subject and other subjects on the curriculum.
- **The application of theory to practice**. Design and communications has as one of its strengths very real life applications of the subject matter and these applications should be utilised to enliven and contextualise the subject.
- **The development of practical drawing skills.** In an era where computerised modelling provides contemporary methods of drawing and editing it is important that the organisational and practical skills afforded by traditional methods of drawing are not overlooked. Design and Communication Graphics requires the student to develop practical drawing and sketching skills. It is important that sufficient time is given to the initial development of these skills at the beginning of the course and their further development throughout the course.
- **The engendering of problem solving skills and creative thinking.** Design and Communication graphics by its very nature is concerned with problem solving skills allied to presentation skills. It is important that problem solving skills be actively encouraged throughout the course by presenting problems to students and eliciting responses to the problems, while recognising that problems may have multiple solutions. In allowing students to become problem solvers we are developing their critical thinking and creative thinking skills which makes the subject a very valuable and useful component of the curriculum.
- **The advancement of lifelong learning skills.** Students should be encouraged to research for themselves topics on the course which will be of benefit to them when engaging with their assignment but which will also prove beneficial as life skills and in helping to raise the profile of the subject.

4.2 Planning for teaching

- **Organisation**

Whilst the assessment of the subject should not dictate the content to be taught, the assessment components should be considered when planning for teaching. Students will be expected to produce an assignment in their final year which will assess their ability to use CAD and to communicate graphically. Students should therefore be practised at sketching and graphic communication throughout the course of the two years. In order for students to make use of their knowledge of CAD they should be introduced to it early in the programme so that they will have developed the required skills and confidence in using the applications.

Each student should have individual access to a computer capable of running parametric modelling software throughout the duration of the course.
Consideration should be given to the use of appropriate homework to enhance the student's research and independent learning skills, to provide a method whereby assessment for learning can be catered for and to assist the students in their understanding of the subject. If students are encouraged at an early stage to observe artefacts and good design through the production of simple assignments this will help the students to confidently and independently approach their own student assignment.

Students should be encouraged to keep all their work in a portfolio, which could be kept at home or in school.

- **Use of resources**

The power of parametric modelling for the teaching of plane and descriptive geometry should be fully utilised through the incorporation of a data projector as an essential piece of equipment for the Design and Communication Graphics classroom. The use of a data projector in the teaching of the subject allows for animations which will greatly enhance and enliven the subject. There are many websites which provide animated graphic sequences that can be used to demystify the subject and to provide assistance in teaching concepts such as dynamic mechanisms and conic sections
The use of the blackboard/whiteboard should not be overlooked, particularly when covering topics such as freehand sketching and ideas sketching.

Design and communication graphics has at its core the communication of graphics and design. In teaching the subject, teachers should be aware of the possible resources at their disposal to communicate the principles of the subject. Data projectors, overhead

projectors, models, textbooks, charts and worksheets will all help to enliven the subject and provide practical examples of graphical communication.

- **Practical examples**

The world wide web is a source of some very good material which could be used in teaching the subject. For example, material could be downloaded and displayed on data projectors and overhead projectors to provide examples of pictorial projection, or animations could be downloaded which will show the operation of items such as dynamic mechanisms.

Proprietary models or models produced in other technological subjects could be used to illustrate concepts and principles.

It is important that school libraries would contain books of a technological nature and books specifically relating to Design and Communication Graphics should be made available to students of this subject.

- **Taking cognisance of associations and basis**

When teaching all areas of the syllabus there should be a concerted effort to make links with material already taught. For example, if teaching surface geometry there should be a direct link made to plane geometry and that the principles used in both topics are the same, just applied differently. Solutions to problems should not be taught without an explanation as to how the construction was derived. Thus, for example, in finding the trace of a plane, given a line on the plane and its inclination, students should be encouraged to sketch the cone and planes of reference in three dimensions and thus determine where the arcs and lines used in the construction of the traces are derived from.

- **Contextualisation**

Where possible an effort should be made to put the material being covered into appropriate contexts and relate it to everyday items. Design and Communication Graphics offers many possibilities for this by comparison with other subjects and this should be seen as a strength of the subject and used to advantage when teaching it.

4.3 Examples of emphases

The particular emphases of the subject have been referred to previously; what follows are some examples these emphases.

A key emphasis of the subject is the communication of graphics and design. This should be central to everything that is done in the subject. Students should be encouraged to sketch solutions to problems and, where appropriate, to sketch the 3-dimensional solution to 2-dimensional problems in such areas as axonometric projection, conic sections and the descriptive geometry of lines and planes. Students should be encouraged to illustrate constructions such as the rebatement of planes, the intersection of planes and the construction of planes to solve skew lines questions. Apart from gaining practice at sketching this will prove invaluable in their assignment since the students will gain a deeper understanding of the concepts involved.

It is important that the underlying principles of plane and descriptive geometry are not overlooked and that the theorems which underpin it are explained in detail. The logic involved in these theorems should be utilised to enhance the logic development of the students. An example of this type of logic would be, when circumscribing a circle about a triangle, explaining why the perpendicular bisector of a chord contains the centre as opposed to just bisecting two sides of the triangle.

4.4 Mixed ability teaching

Where both Higher level and Ordinary level students are in the one class it is important that both levels are encouraged and that appropriate time be given to both groups. When studying the areas of the course which are common to both levels there should be minimal differentiation between levels so as to encourage the Ordinary level student as much as possible. It should be made clear to the class when Higher level only material is being taught, so that the Ordinary level students are not put off by the more abstract areas of the syllabus. Whilst it is important that students should be challenged to explore all areas of the course in as much detail as possible, Ordinary level students should not be discouraged by insisting that they complete Higher level areas of the syllabus. Instead, worksheets in the form of revision sheets could be introduced for the Ordinary level students while the Higher level students progress to analyse a topic in more detail.

4.5 ICT integration

Design and Communication Graphics offers very real and practical uses for information and communication technology. CAD rightly forms a key element of the subject. However, the use of digital media such as digital cameras and scanners should be encouraged as students investigate the aesthetic worth and design of objects. Students will have to complete their assignment which will necessitate the use of ICT.

Their skills in its use must be built up throughout the course, not just prior to the completion of the student assignment.

4.6 Industrial visits

Where feasible and relevant, students may derive benefit from a visit to a local enterprise or business which engages in or involves elements of design and/or CAD, for example the realisation of design in such processes as rapid prototyping.

4.7 Safety and organisation

In addition to the school's overall health and safety policy and procedures, students should be aware of the potential hazards associated with the use of traditional drawing equipment and computer resources, including ergonomic considerations.

5 Assessment

The gathering and interpreting of information related to the student's progress and understanding of material forms an important component of any subject. Assessment should provide feedback to students, while also forming the basis for certification. Questioning, setting and correcting of homework and written tests are some examples of how assessment takes place.

It is evident therefore that there are two types of assessment, assessment **for** learning and assessment **of** learning. Both modes of assessment should be seen as complementary rather than opposing or contradictory.

Assessment for learning

The key principles of assessment for learning are:

• sharing learning goals with students
• helping students to recognise the standards they are aiming for
• involving students in assessing their own learning
• providing feedback, which helps students to recognise what they must do to close any gaps in their knowledge or understanding
• communicating confidence that every student can improve
• adjusting teaching to take account of the results of assessment.

Teachers check students' work regularly and, based on this, provide advice to the students and set learning targets for them.

Assessment of learning

The terminal examination and the student assignment will form the basis on which students will be assessed in the state examinations. Formal assessment, in the form of class tests, will give an indication of the level of attainment of students and should occur on a regular basis throughout the year.

5.1 Structure of subject examination

The formal examination of Design and Communication Graphics differs significantly from the formal examination of its predecessor, Technical Drawing. Instead of two terminal examination papers there will now be one terminal examination paper and a student assignment.

Student Assignment

The purpose of the student assignment is to examine areas of the syllabus which could not at present be assessed appropriately in a terminal examination. The design element of the syllabus can best be examined through the medium of a student assignment. Other areas which can best be examined through a student assignment are CAD and freehand sketching. The student assignment will credit students for their evaluation of the aesthetic worth of artefacts. The student assignment will also provide the opportunity for students to develop their research, presentation and reflection skills.

The production of the student assignment will provide very valuable exposure for the subject and teachers should use the student assignment to showcase the work that goes on in the subject.

Terminal Examination

The examination at both Higher and Ordinary level will be of 3 hours duration.

It is expected that students will be taught all areas of the core and two option areas. To reflect this, the examination will have five questions based on the core and five based on the options. The students will be expected to attempt a total of five questions, three from the core and one each from the two options which they have studied.

Question 1 will be a compulsory question and have its basis in the core. It will comprise five parts of which the candidate will have to attempt four. There will be a total mark of 60 for this question.

Questions 2-5 will be based on the core and the candidate will be required to attempt two of these. Each of these questions will be assigned a total of 45 marks. The questions will be taken from the areas of projection systems, conic sections, intersection and development of surfaces, and the descriptive geometry of lines and planes.

Questions 6-10 will represent the five options, one question from each area. Each option question will be worth 45 marks and students will be required to attempt two of these questions. This arrangement is illustrated in the table opposite.

In determining the layout of the examination paper, the desire to ensure coverage of the course was balanced with a desire to afford the student some choice on the paper. Students will attempt three questions in the core section (including the compulsory first question). This will ensure that candidates must answer questions related to all areas

of the core. The Plane Geometry area of study permeates each of these four areas and may be examined in this manner

The section of the paper which covers the core affords the students some choice on the day of the examination. The choice in relation to the options will have been made prior to the examination.

The length and factor of difficulty of each question will be commensurate with the time allotted to the examination paper.

Question			Choice	Marks
1	**5 parts from various areas of the core**	**Student must attempt 4 parts**	**Compulsory**	**60**
2 - 5	**This section of the paper will contain four questions which will be based on material from the following syllabus areas:** • **Projection Systems** • **Conic Sections** • **Intersection and Development of Surfaces** • **Descriptive Geometry of Lines and Planes**	**Each question will be a multi-part question**	**Student must attempt 2 questions**	**90 (2x45)**
6	**This question will be based on Dynamic Mechanisms**	**This will be a multi-part question**		
7	**This question will be based on Structural Forms**	**This will be a multi-part question**		
8	**This question will be based on Surface Geometry**	**This will be a multi-part question**	**Student must attempt 2 questions**	**90 (2x45)**
9	**This question will be based on Geologic Geometry**	**This will be a multi-part question**		
10	**This question will be based on Assemblies**	**This will be a multi-part question**		
			Total	240