



UNIVERSITEIT VAN PRETORIA  
UNIVERSITY OF PRETORIA  
YUNIBESITHI YA PRETORIA



## Faculty of Engineering, Built Environment and Information Technology

### Fakulteit Ingenieurswese, Bou-omgewing en Inligtingtegnologie

School of Engineering  
Skool vir Ingenieurswese

Department of Mechanical and Aeronautical Engineering  
Departement Meganiese en Lugvaartkundige Ingenieurswese

**Graphical communication: MGC 110**  
**Grafiese kommunikasie: MGC 110**

Lecturers: Mr. R Meeser, Dr. L Smith  
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## 1. DEPARTMENTAL STUDY GUIDE

*This study guide is a crucial part of the general study guide of the Department. In the study guide of the Department, information is given on the mission and vision of the department, general administration and regulations (professionalism and integrity, course related information and formal communication, workshop use and safety, plagiarism, class representative duties, sick test and sick exam guidelines, vacation work, appeal process and adjustment of marks, university regulations, frequently asked questions), ECSA outcomes and ECSA exit level outcomes, ECSA knowledge areas, CDIO, new curriculum and assessment of cognitive levels. It is expected that you are very familiar with the content of the Departmental Study Guide. It is available in English and Afrikaans on the Department's website.*

### **English:**

[https://www.up.ac.za/media/shared/120/ZP\\_Resources/Noticeboard/departmental-studyguide-eng-2019\\_version29-jan2019.zp167517.pdf](https://www.up.ac.za/media/shared/120/ZP_Resources/Noticeboard/departmental-studyguide-eng-2019_version29-jan2019.zp167517.pdf)

### **Afrikaans:**

[https://www.up.ac.za/media/shared/120/ZP\\_Resources/Noticeboard/departementele-studiegids-afr-2019\\_weergawe29-jan2019.zp167518.pdf](https://www.up.ac.za/media/shared/120/ZP_Resources/Noticeboard/departementele-studiegids-afr-2019_weergawe29-jan2019.zp167518.pdf)

**Take note of the specific instructions in the above study guide on:**

- a. Safety**
- b. Plagiarism**
- c. What to do if you were sick (very important)**
- d. Appeal process on the adjustment of marks**

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## ORGANISATIONAL COMPONENT

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### 2. GENERAL PREMISE AND EDUCATIONAL APPROACH

The general objective with this module is to emphasize **understanding** rather than memorizing, in order to **visualize** engineering solutions and to stimulate **creative thinking** in the field of engineering drawing. A problem-driven approach to learning is followed. Student-centred and co-operative learning and teaching methods are applied during lectures, tutorial classes and practicals, in order to optimally develop the above-mentioned skills, as well as to stimulate the development of communication skills, interpersonal skills and group dynamics.

You are expected to participate in discussions during lectures. As your fellow students are dependent on the inputs you make, your participation is crucial. After all, you are also dependent on their contributions.

The effective use of Engineering Drawings is **essential** in the communication between engineers of all engineering disciplines. In the study of this module skills are developed to enable students to visualize engineering solutions and to communicate these solutions to others by means of **freehand** sketches.

### 3. LECTURERS, VENUES AND CONSULTING HOURS

Staff	Name	Room No. and Building	Telephone No.	Email Address
Module Manager, Lecturer- Manufacturing	Mr. R.F. Meeser	Eng I: 9-6	012 420-2194	<a href="mailto:Riaan.Meeser@up.ac.za">Riaan.Meeser@up.ac.za</a>
Lecturer-Drawing	Dr. L. Smith	Eng I: 9-13	012 420 5366	<a href="mailto:Lelanie.Smith@up.ac.za">Lelanie.Smith@up.ac.za</a>
Lab. Instructors	Mr. W. Murray	Eng I: 9-9	012 420-2686	<a href="mailto:Wim.Murray@up.ac.za">Wim.Murray@up.ac.za</a>

**Location of Theory classes:** Please consult the official University timetable as venues are subject to change.

**Location of the Practical classes:** Eng 3-7

#### Consulting hours:

Hours for consultation of lecturers and instructors will be displayed on their office doors. Students may consult lecturers and instructors only during the consulting hours as indicated, or by appointment (via email). This policy also holds before tests and exams. In other words, lecturers and instructors are only available during their normal consulting hours on the day before a test or examination. This policy aims to encourage students to plan their work and to work continuously.

### 4. STUDY MATERIALS AND PURCHASES

- A set of MGC110 notes must be bought **from the relevant bookstore: WizeBooks. Students should endeavour to have their own set of notes before lectures start.**
- Limited Lecture Slides will be made available prior to certain lectures on Click-UP (University Web based learning service). – The lecture slides are however only to be used to guide a

*student through a lecture and not to be used solely as reference material (Not to replace textbooks).*

- *A3 drawing paper exhibiting the **official U.P. title block** is to be purchased from the relevant bookstore(s). You will need approximately 13 – 15 of these sheets during the course of this module.*
- *Relevant drawing utensils such as an appropriate clutch pencil, eraser, eraser shield etc. are required for practical classes and tests. Drawing boards and rulers **are not allowed**.*

## **5. LEARNING ACTIVITIES**

### **5.1. Contact time and learning hours**

*Number of lectures per week: 3 **as per your departmental timetable***

*Number of practical classes per week: one practical class of 2½ hours **strictly as per your departmental timetable***

*This module carries a weight of 16 credits, indicating that on average a student should spend some 160 hours to master this subject (including time for preparation of tests and examinations). The average contact time is approximately 5 hours per week, meaning that another 5 hours per week of own study time should be devoted to the module.*

### **5.2. Lectures**

*Lectures are presented in a style of co-operative and student-centred learning. Brief clarification and explanation of the subject matter and concepts are given during the lectures. Students are advised to participate actively in discussions. Lecture's attendance is compulsory and may be checked.*

### **5.3. Practical classes and assignments**

*The timetable provides for one, 2½hour, practical session per week. The practical classes will consist of conventional freehand sketching. Assignments for computer-aided drawing will be handed out as homework exercises during the course of the semester. During each practical class, problems and exercises related to the present work dealt with in the lectures are done. A lecturer and instructors will be available for consultation and assistance to students during practical sessions. Teaching assistants (senior students) will also be present to aid the lecturer and instructors. At the start of certain of the practical sessions a short test related to the contents of the work **may** be written. The test marks will be incorporated in the semester mark.*

## **6. RULES OF ASSESSMENT**

*Also see the examinations regulations in the Year Books of the Faculty of Engineering, Built Environment and Information Technology.*

**Pass requirements:** *In order to pass the module a student must obtain a final mark of at least 50%.*

### **Calculation of the final mark:**

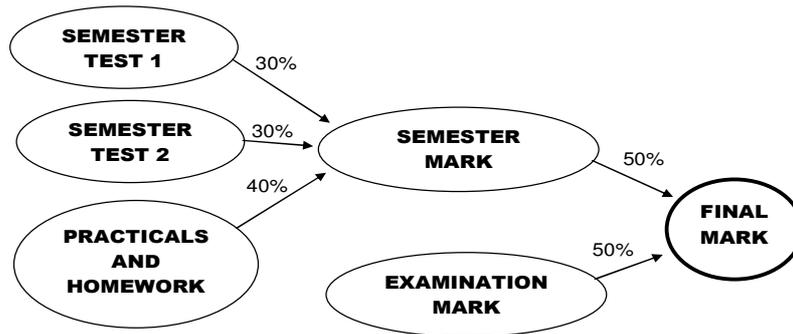
*Semester mark: 50%*

*Examination mark: 50% (The duration of the final examination is 3 hours.)*

**Calculation of the semester mark** The semester mark is compiled as follows:

Semester tests: 60%

Practical classes: 40%



**Figure: Determination of the final mark**

**Semester tests:** Two tests will be written during the scheduled test weeks of the School of Engineering, dates, time and venues will be announced as soon as the timetables become available.

For **sick test** information, see departmental study guide.

**Practicals and homework:** The 7 best assignment marks will be used to determine the practical average, with the exception of the CAD assignment, which is compulsory. Due to the amount of hours spent, the CAD assignment will contribute the same amount as 3 practical sessions. This incentive of using the 7 best marks allows for an improved practical average mark. In the event of a student being sick for a practical session this incentive also makes room for missing marks without it being detrimental to their semester mark as no catch-up assignments will be possible.

### **Promotion**

Promotion for any component of this module is **not** possible.

## **7. GENERAL**

### **7.1. Web-based learning services (Click-UP)**

Each student is to familiarize themselves with the University's Click-UP system. **You are required to log onto Click-UP at least once per day and to also read your university email at least once a day.** Click-UP is available from the computer labs on campus, or via the internet if you are logging on from off-campus or from mobile smart devices like phones and tablets.

Lecture slides, CAD assignments, discussion tools, additional resources etc. will be made available via the web-based module. Lecture slides posted onto Click-UP are to be used to guide students during their preparation prior to lectures.

### **7.2. Plagiarism**

Although students are encouraged to ask questions of the lecturer and instructors during practical sessions, all work must be the student's own. This aspect applies especially to the computer work. **Under no circumstance is a student allowed to copy the work of somebody else. All work which is submitted for grading must be the student's own individual work unless otherwise announced or indicated. All CAD assignment submissions must be accompanied by a signed plagiarism statement.** For more information on plagiarism and what is meant by it, please consult the departmental study guide.

### 7.3. Anomomous data

Please note that student's marks, online participation or class attendance statistics may be used for statistical and research purposes, but will always be used anomomously.

## 8. MODULE STRUCTURE

<b>Study theme and Study units</b>	<b>Mode of instruction</b>	<b>Notional hours</b>	<b>Contact sessions</b>
1. Introduction and fundamental principles of graphics communications 1.1 Freehand sketching 1.2 Projections methods 1.3 Multiple views 1.4 Line types	Lectures and Class discussion, practical sessions and self study	3	1
2. Projection techniques 2.1 Isometrics views 2.2 Orthographic views	Lectures and class discussion, practical sessions and self study	8	3
3. Dimensions 3.1 Rules for dimensioning.	Lectures and class discussion, practical sessions and self study	6	2
4 Sectional views 4.1 Crosshatching 4.2 Sectioning methods	Lectures and class discussion, practical sessions and self study	6	2
5. Auxiliary views	Lectures and class discussion, practical sessions and self study	4	2
6. Working drawings 6.1 Presentations of standard components 6.2 Detail drawings 6.3 Assembly drawings	Lectures and class discussion, practical sessions and self study	15	5
7. Computer Aided Drawing	Lectures and class discussion and self study	15	5
8. Basic manufacturing processes	Lectures and class discussion and self study	33	11
9. Freehand drawing practical	Individual drawings	50	10x2.5
10. Computer aided drawing practical	Individual drawings	20	
	<b>Total</b>	<b>160</b>	<b>56</b>

**Note:** The notional hours include the contact time, as well as the estimated time to be allocated for self study, preparation of assignments and preparation for tests and the examination.

## 9. STUDY THEMES

### 9.1. STUDY THEME 1: Graphical language, drawing techniques and projections.

#### 9.1.1. Learning outcomes

Practically all tasks require the student to represent three dimensional (isometric) objects as flat (orthographic) representations, or the opposite (and it is often more difficult), from orthographic to isometric. In the process the student's ability to think three dimensionally is stimulated.

At the end of this study theme the student will:

- have a **knowledge** and **understanding** of the different projections methods used in graphical communication.
- have the **knowledge** and insight to construct an isometric sketch.
- have the **knowledge** to construct multiple views of an object
- be able to **derive** and sketch an isometric sketch from multiple views of an object.
- have knowledge of the line alphabet.

#### 9.1.2. Study Units

Refer to the appropriate pages in the MGC110 Notes and the lecture slides supplied on Click-UP.

#### 9.1.3. Self study activities

- Students are encouraged to read / revise the appropriate material in the notes before or after the formal contact sessions.
- Additional exercises may also be done in the student's own time to develop his/her drawing skills. Drawing exercises can be found in the rear of the notes.

#### 9.1.4. Assignments for assessment

Assignment with problems based on this study theme will be done in the practical periods.

#### 9.1.5. Criteria of assessment

At the end of this study theme the student will be able to:

- draw multiple views of an object.
- use the correct line types in his/her drawing.
- draw simple isometric drawings

### 9.2. STUDY THEME 2: Projection techniques

#### 9.2.1. Learning outcomes

At the end of this study theme the student will:

- have an **understanding** of the construction of an isometric drawing.
- have a **knowledge** and **understanding** of orthographic projections techniques and the practical application thereof.
- have a **knowledge** and **understanding** of the difference between first- and third angle projection.
- have a **knowledge** and **understanding** of the use of centre lines and pitch circles on orthographic projections
- have the **knowledge** and **understanding** of the selection of the principal view.

### 9.2.2. Study units

Refer to the appropriate pages in the MGC110 Notes and the lecture slides supplied on Click-UP.

### 9.2.3. Self study activities

Students are encouraged to read / revise the appropriate material in the notes before or after the formal contact sessions.

### 9.2.4. Criteria for assessment

At the end of this study theme the student will be able to:

- construct an isometric view from multiple orthographic views.
- select the principal view of a component.
- draw multiple (orthographic) views from an isometric view
- construct a third orthographic view from two given views

## 9.3. STUDY THEME 3: Dimensioning

### 9.3.1. Learning outcomes

At the end of this study theme the student will:

- have the **knowledge** and **understanding** that dimensions are not arbitrarily placed on a drawing, but follow rules that improve the reading and accuracy of the drawing.
- have the **knowledge** and **understanding** of the rules with respect to the placement of dimensions on a drawing and be able to **apply** this knowledge to the dimensioning of a drawing.

### 9.3.2. Study units

Refer to the appropriate pages in the MGC110 Notes and the lecture slides supplied on Click-UP.

### 9.3.3. Self study activities

Students are encouraged to read / revise the appropriate material in the notes before or after the formal contact sessions.

### 9.3.4. Criteria for assessment

At the end of this study theme a student will be able to:

- dimension a drawing correctly according to general dimensioning standards.
- correct an improperly dimensioned drawing.

## 9.4. STUDY THEME 4: Section views and crosshatching

### 9.4.1. Learning outcomes

At the end of this study theme the student will:

- have an **understanding** of the use of sectional views in order to make drawings more readable by showing internal detail more clearly than can be shown by hidden detail.
- have a **knowledge** and **understanding** of the rules with respect to the crosshatching of components and be able to **apply** these rules in drawings.

•have knowledge of the different sectioning methods (full- half-, revolved-, partial sections, etc) and be able to **apply** these methods in the appropriate ways.

#### **9.4.2. Study units**

Refer to the appropriate pages in the MGC110 Notes and the lecture slides supplied on Click-UP.

#### **9.4.3. Self study activities**

Students are encouraged to read / revise the appropriate material in the notes before or after the formal contact sessions. Hatching styles are to be practiced by the student at home.

#### **9.4.4. Criteria for assessment**

At the end of this study theme a student will be able to:

- apply sectional views to components.
- know and explain the different sectioning methods.

### **9.5. STUDY THEME 5: Auxiliary views**

#### **9.5.1. Learning outcomes**

At the end of this study theme the student will:

- have the **knowledge** and **understanding** that the six standard orthogonal views cannot always describe and object adequately and that for these cases an auxiliary view is created.
- have the **knowledge** and **understanding** of the methods used to construct an auxiliary view.
- have the **knowledge** and **understanding** of the use of auxiliary views to determine the true size of a plane or a line and be able to **apply** this knowledge to practical examples.

#### **9.5.2. Study units**

Refer to the appropriate pages in the MGC110 Notes and the lecture slides supplied on Click-UP.

#### **9.5.3. Self study activities**

Students are encouraged to read / revise the appropriate material in the notes before or after the formal contact sessions.

#### **9.5.4. Criteria for assessment**

At the end of this study theme the student will be able to:

- construct an auxiliary view
- reconstruct the standard view from the auxiliary view.
- use auxiliary views to determine the true size of a plane/line

## 9.6. STUDY THEME 6: Working drawings

### 9.6.1. Learning outcomes

At the end of this study theme the student will:

- have a **knowledge** and **understanding** of the differences between detail and assembly drawings.
- have knowledge of the representation of certain standard components on assembly drawings.
- have knowledge and **understanding** of parts lists and is able to **apply** this knowledge to create a parts list.
- have a **knowledge** and **understanding** of the limited use of dimensions on an assembly drawing and be **able** to apply this knowledge to add the correct dimensions to an assembly drawing.
- have a **knowledge** and **understanding** of the rules of crosshatching with respect to assembly drawings and be able to **apply** this knowledge to construct a sectioned assembly drawing.

### 9.6.2. Study units

Refer to the appropriate pages in the MGC110 Notes and the lecture slides supplied on Click-UP.

### 9.6.3. Self study activities

Students are encouraged to read / revise the appropriate material in the notes before or after the formal contact sessions. Basic knowledge of simplistic engineering assemblies will be useful when attempting to do the assembly drawing practicals. For additional exercise, student may attempt the to assembly assignments supplied in their MGC110 during their own time.

### 9.6.4. Criteria for assessment

At the end of this study theme the student will be able to:

- construct an assembly drawing,
- add a parts list to the assembly drawing,
- add the proper dimensions to an assembly drawing.
- draw standard components such as bolts correctly on an assembly drawing.

## 9.7. STUDY THEME 7: Computer-aided drawing (CAD)

### 9.7.1. Learning outcomes

At the end of this study theme the student will:

- have a **knowledge** and **understanding** of the basic principles involved in computer aided drawing.
- Understand** the basic principles of parameter driven solid modelling
- have a **knowledge** and understanding of the construction of a solid model
- have a **knowledge** and **understanding** of the generation of a detail drawing from a solid model
- have a **knowledge** and **understanding** of the generation of sections and auxiliary views
- have a **knowledge** and **understanding** of dimensioning a drawing on the computer.

### 9.7.2. Study units

Attendance to the CAD demonstration lectures is compulsory. No additional notes will be supplied on the topic and students are expected to take down their own notes during the demonstration classes.

### 9.7.3. Self study activities

The student must familiarise him/her self with the program by working through the online tutorials. It is also the responsibility of the student to register with the computer lab in NWII, and familiarize him/her with the working of the lab. **The student must ensure that whether he works from home or in the campus computer labs, he/ she are able to print their CAD assignments.**

Students are advised to visit the appropriate web based information pages as will be announced in class.

### 9.7.4. Criteria for assessment

There will be two individual assignments which each student will have to submit during the semester. The dates and assignments will be announced during the CAD demonstration classes. Each student is required to understand and sign the plagiarism statement on the drawing sheet if they wish to submit their work for assessment.

At the end of this study theme the student will be able to:

- Create a detail drawing from a solid model
- Dimension a detail drawing.
- Construct a simple solid model on the computer (for enrichment)

## 9.8. STUDY THEME 8: Basic manufacturing processes

### 9.8.1. Learning outcomes

Engineering drawings are detailed instructions for manufacturing the described objects. Therefore, both the designer and the creator of the drawings must understand the basic manufacturing processes.

At the end of the study theme the student should be able to

- describe the basic manufacturing processes
- identify the basic forming operations such as casting, forging, etc.
- identify the operations that can be performed with a lathe, drill press, milling machine, grinder, shaper, and broach,
- understand the basic sheet metal processes
- understand the difference between good and poor design practices

### 9.8.2. Study units

Notes on basic manufacturing processes as supplied in the MGC110 Notes.

### 9.8.3. Self study activities

Use the knowledge of basic manufacturing techniques and find out how the different components are manufactured

### 9.8.4. Assignments for assessment

As part of a drawing assignment it can be expected of the student to specify the manufacturing method of a component.

### **9.8.5. Criteria of assessment**

At the end of this study theme the student must be able to:

- describe the different manufacturing processes
- identify the manufacturing process used in the manufacturing of an existing product
- apply the knowledge to select an appropriate method for the manufacturing of a component.