



UNIVERSITY  
OF  
JOHANNESBURG

Faculty of Science

Department of Pure  
and Applied Mathematics

Applied Mathematics 1A

Introduction to Statics

APM01A1/APM1A10

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## 1 Introduction

In Applied Mathematics, problems from real life are solved by using mathematical models. The sources of these problems are diverse, and include the following fields: biological science, computer science, earth and engineering science, economic science, medical science, and social science. Two skills are therefore required from students in this field:

- i. the ability to transfer the essence of a problem to a mathematical model
- ii. the technical skill required to solve the resultant mathematical problem

None of these skills can be “taught” to anyone—the student has to master them *personally* by hard, and more importantly, *continuous* work. The best way to practise these skills is by working through a large number of problems. With this in mind the lecturers will set the class a large number of problems. Tutorials will also be held weekly, where students work at problems under the supervision of the lecturers and senior students. Students are nevertheless encouraged to tackle topical problems on their own.

## 2 Important information

- Your lecturers for the course are

<b>Mr KD Anderson</b>	
<b>Office:</b>	B Ring 528
<b>Telephone:</b>	+27-11-559-3640
<b>Email:</b>	kdanderson@uj.ac.za
<b>Consultation:</b>	Thursday, 10:30 – 12:05
<b>Dr GJ Kemp</b>	
<b>Office:</b>	B Ring 525
<b>Telephone:</b>	+27-11-559-3223
<b>Email:</b>	gkemp@uj.ac.za
<b>Consultation:</b>	Monday, 13:00 – 14:35

- The secretary for Applied Mathematics is

<b>Mrs S Geldenhuys</b>	
<b>Office:</b>	B Ring 527
<b>Telephone:</b>	+27-11-559-2067
<b>Email:</b>	sgeldenhuys@uj.ac.za
<b>Availability:</b>	Weekdays, 08:00 – 12:30

The Department of Pure and Applied Mathematics consists of two divisions:

- Applied Mathematics, situated within the western passageway of B Ring 5
- Pure Mathematics, situated in the central and eastern passageways of C Ring 5

The Applied Mathematics division annually offers courses to approximately 1 000 students in the Faculty of Science and the Faculty of Engineering and the Built Environment. Courses are offered in basic topics as well as topics related to the research fields of the division, and include the following main themes: classical mechanics, differential equations, numerical analysis, optimization, scientific computing and variational calculus. The postgraduate programme of the division is mainly focused on the active research programme of its staff, which covers the following

fields: differential equations, dynamical systems, numerical analysis, and scientific computing. Postgraduate students are confronted throughout with actual research problems.

### 3 Access

- Students who enrol for this module are included in the official class list. Any student whose information does not appear on the class list may NOT hand in assignments or write any assessments or examinations.
- A student who enrolls for this module for the first time must meet the entrance requirements for the Mathematical Sciences in the Faculty of Science. This implies *inter alia* that the student must have obtained an APS of 6 for Grade 12 Mathematics when enrolled for a Science degree and an APS of 5 for Grade 12 Mathematics when enrolled for an Engineering degree.
- Students who repeat the module must take note of the following general regulation of the University of Johannesburg: *a student may only enrol for a given module twice*. Special permission must be granted by the Dean of the relevant faculty for any further enrolment.
- Applied Mathematics 1A (APM01A1/APM1A10) is an independent semester course (like all other courses in Applied Mathematics). Applied Mathematics 1A and Mathematics 1A (MAT01A1 for Science students, MATENA1 for Engineering students) are both prerequisites for Applied Mathematics 1B (APM01B1/APM1B10), which is offered in the second semester. This means that both these courses have to be passed before the student is admitted to APM01B1. Students enrolled for extended degree programmes or alternative semester mathematics offerings should speak to the lecturers if they are uncertain about the prerequisites.

### 4 Tuition

Tuition in APM01A1/APM1A10 consists of four lecture periods and two tutorial periods per week. The lecturers will explain the theoretical content of the module during lectures and illustrate important concepts via examples. In the tutorials students work on given problems under the supervision of the lecturers and senior students. The educational value of these tutorials is so highly valued that the student's work at every tutorial is evaluated and will contribute toward the student's final period mark. *Attendance of lectures and tutorials are compulsory per the regulations of the University!*

#### 4.1 Times and venues

Offering	Timetable code	Day	Time	Science	Engineering
Lecture	O1, O2	Monday	10:30 – 12:05	C Les 102	E Les 200
	O3	Thursday	16:20 – 17:05		
	O4	Friday	11:20 – 12:05		

Offering	Timetable code	Day	Time	Group	Venue
Tutorial	H3, H4	Thursday	13:00 – 14:35	1	C Les 203
				2	C Les 204
				3	D Les 202
				4	D Les 203
				5	D Les 204
				6	D Les 106

## 4.2 Consultation

Lecturer	Day	Time
Mr Anderson	Thursday	10:30 – 12:05
Dr Kemp	Monday	13:00 – 14:35

If a student wishes to consult with the lecturers *outside* the specified consultation times, then they are requested to make an appointment via email at least 24 hours in advance of the proposed appointment time. To avoid confusion, students are asked to adhere to the following guidelines:

- The subject line must include a
  - prefix with the module code APM01A1 (or APM1A10)
  - one line description of the problem, no longer than five words
- The body of the email should make reference to the section of work with which the student has a problem and the student should give a detailed description of the problem they are having. This helps resolve the problem expediently during the consultation appointment.
- Ensure that proper English language is used throughout—this also applies to all other communications as well and is inclusive of semester tests and exams. Students are advised to avoid the use of slang, neologisms, and so-called “SMS language”.

For example

<p>From: 2017xxxxx@student.uj.ac.za  To: gkemp@uj.ac.za  Subject: APM01A1 vector auxiliary result.</p> <p>Greetings Dr Kemp.</p> <p>I had difficulty understanding the derivation of the auxiliary result in example 1.6.3 on page 23, especially how the second equation was obtained.</p> <p>Could I make an appointment to see you on Tuesday, 22 March 2017, at 10:00?</p> <p>Kind regards,  AB Student</p>
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*Any email that does not adhere to these guidelines will be ignored by the lecturers without any hesitation.*

### 4.3 Rules of conduct

Students will be treated as adults. This implies that students have the freedom to choose their own academic lifestyles while at the same time bearing full responsibility for the consequences of their choices. The lecturers will not attempt to police the students in any way (e.g. strict monitoring of lecture/tutorial attendance). However, where students are in contact with the lecturers or any other functionary of the University a certain level of civility will be expected. Some points need to be emphasized:

- Because contact time is very limited, it is imperative that optimal use be made of this time. The lecturers will therefore exercise strict punctuality with respect to the starting times of lectures and the same will be expected of students.
- It is in the interest of serious students that lectures proceed in an orderly way. Out of mutual consideration students will therefore refrain from social interaction during lectures.
- Students will respect the personal space of the lecturers when in conversation with the lecturers.
- *The onus rests on students to acquaint themselves with the disciplinary code of the University. All students will be held accountable by this code.*

## 5 Assessment

Students will have two assessment opportunities, called *semester tests*, during the course of the semester where their understanding of the course content will be tested. These assessments will take place on the following dates:

Assessment	Date
Semester Test 1	16 March 2017
Semester Test 2	20 April 2017

Venues will be communicated to students in due time before each semester test. *Note that the attendance of both semester tests is compulsory!* Exemptions will only be granted under special circumstances—see §5.1.

At the end of the semester a final period mark (FPM) is calculated for each student. This mark is derived from the student's marks in both semester tests and a selection of the assignments done during the tutorials. The FPM is calculated as follows:

$$\text{FPM} = 45\% \times (\text{Semester Test 1}) + 45\% \times (\text{Semester Test 2}) + 10\% \times (\text{Tutorial Mark}).$$

Note that a student requires an FPM greater than or equal to 40% to be admitted to the final examination. If a student is admitted to the examination, he/she will earn an examination mark (EM) upon attendance and completion of the final examination. *Note that attendance of the final examination is compulsory!* Students require an EM greater than or equal to 40% to pass the final examination.

The FPM and EM are combined to yield a final mark (FM), which is calculated as follows:

$$\text{FM} = 50\% \times (\text{FPM}) + 50\% \times (\text{EM}).$$

*Students require a FM greater than or equal to 50% to obtain credit for this module!* Students whom obtain a FM greater or equal than 75% will pass with distinction.

**Pass requirements:** Credit for this module requires both a *minimum final mark of 50%* and a *minimum exam mark of 40%*. A student is admitted to the final examination by obtaining a *minimum final period mark of 40%*.

*All marks are calculated objectively and are not subject to any form of negotiation.*

## **5.1 Missed assessment opportunities**

Exemptions will only be granted in cases where a student can provide a medical certificate (from a registered medical practitioner) certifying that the student was not able to take the test due to illness or in cases where a student experiences an urgent personal crisis (such as a death in the immediate family). If exemption is granted, the lecturers will make arrangements for a substitute test. It is likely that the substitute semester tests will be written in the week following the relevant semester test. *Note that the regulations of the University require a medical certificate to be submitted within seven calendar days of the scheduled test!*

*A student may not apply for the substitute assessment opportunity due to poor results in or failure of the scheduled assessment opportunities!*

### **5.1.1 Supplementary, Substitute, or Aegrotat (SSA) Assessment:**

This is colloquially referred to as the “sick test”. The application for a substitute or aegrotat assessment opportunity is done by

1. Applying in writing using the approved application form, which is available from Edulink, the ISSC website or the relevant Faculties.
2. Section 2 of the application form **MUST** be completed by the medical practitioner (doctor) consulted in the case of an illness. If this is not done, the application will be deemed invalid and the student may not take part in the special assessment opportunity.
3. If all documentation has been completed, the application forms must be submitted to Mrs. Geldenhuis or the lecturer, and it must be submitted within one week (7 days) of the relevant semester test that was missed.

Failure to comply to this procedure will invalidate any application for a special assessment opportunity. The venue and time slot of the substitute semester test will be communicated to students during lectures and will be posted on the notice boards outside B Ring 5 and online.

### **5.1.2 Supplementary, Substitute, or Aegrotat (SSA) Exam:**

In the event of illness or death of an immediate family member and the student was unable to sit for the exam, then the student may apply to write a substitute or aegrotat examination. The student must apply for the special exam *with the relevant Faculty, and not the department*. The relevant application form can be obtained from the relevant Faculty, and must be given back *not later than seven days* after the original examination to the relevant Faculty with the appropriate accompanying documentation.

## 6 Module resources

### 6.1 Electronic

This module can be found on Blackboard under

17APM01A1: INTRODUCTION TO STATICS

There is also a separately maintained website, run by the Division, which can be found at the URL

<http://issc.uj.ac.za/appliedmaths/apm1a/index.html>

### 6.2 Notes

The APM01A1/APM1A10 and APM01B1/APM1B10 courses mainly follow a set of bilingual notes:

*Inleiding tot Meganika / Introduction to Mechanics* (by CM Villet)

These notes are obtained by paying the amount of R250 into account number

**05/05/081100/20/16200/0**

at the University Cashiers and then presenting the receipt to Applied Mathematics' secretary.

A large number of texts relating to the course are available in the library and at bookshops and can all be used to advantage. Some of these books are:

- M.R. Spiegel, *Theory and Problems of Vector Analysis*, Schaum Publishing Company, 1959.
- B. Spain, *Vector Analysis*, D. van Nostrand, 1965.
- D.E.C. Christie, *Vector Mechanics*, McGraw-Hill, 1964.
- F.P. Beer & E.R. Johnston, *Vector Mechanics for Engineers*, McGraw-Hill, 1977.
- R.C. Hibbeler, *Engineering Mechanics*, MacMillan, 1989.
- J.L. Meriam & L.G. Kraige, *Engineering Mechanics*, John Wiley, 1987.
- D.J. McGill & W.W. King, *Engineering Mechanics: Statics and an Introduction to Dynamics*, PWS-KENT, 1995.

## 7 Information dissemination

General information and information pertaining to this particular module at the department will be conveyed to students either verbally, in print or electronically. Verbal dissemination occurs during lectures. Information released in print will be available on the notice boards outside the division's entrance at B-Ring 5. Electronic release of information will be achieved via Blackboard or the ISSC website (cf. §6).

It will be the responsibility of the student, and not the lecturer, to make sure that they know where information pertaining to this module will be released and to read it on their own.

*In any matter of dispute, ignorance, whether negligent or wilful, of information verbally given in class or published on Edulink or the ISSC website, will not be used as an excuse for work not being completed or an assesment opportunity not being attended and will carry no weight in substantiating why the work had not been completed or why the assesment opportunity was not attended.*



## 8 Grievance procedure

Any academic complaints should first be reported to the lecturer of the module. Should the proposed solution to the problem not be to the satisfaction of the student, they may then approach the Head of Department. The Head will decide if the complaint has any merit and if applicable, propose an alternative solution.

Should the student still feel grieved, they have the right to consult progressively higher up the hierarchy of the Faculty with the Vice Dean and then the Executive Dean if necessary. The relevant Executive Dean will be the final arbiter regarding the student's complaints pertaining to academic programmes.

Thereafter, should the complaint remain unresolved based on procedural grounds that could lead to a case of procedural unfairness (with particular reference to the University's Academic Regulations), the matter may be referred to the Registrar.

If the student does not want to deal with the academic staff directly, he/she may instead report the complaint to the appropriate representative of the SRC.

*The student should avoid reporting his/her complaint to several people at the same time.*