MONASH University

Unit Guide

MTH1030
Techniques for modelling

Semester 2, 2017

Handbook link:
http://monash.edu.au/pubs/2017handbooks/units/MTH1030.html

Note to students:
Burkard the unit coordinator for this unit really loathes unnecessary e-mails. Please before you ask him any questions make sure that it is not already answered in this unit guide. Also, in the first instance please address all questions you may have about this unit to your lecturer or Dr Santiago Barrera Acevedo the person in charge of the day-to-day running of the unit.

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Unit handbook information

Synopsis

Solution of systems of linear equations using Gaussian elimination; matrices, determinants, eigenvalues and eigenvectors; introduction to vectors; methods of integration - substitutions and integration by parts; solution of first-order ordinary differential equations - separable, use of integrating factor; solution of second-order linear ordinary differential equations with constant coefficients and applications; Taylor series and series convergence; the remainder term.

Mode of delivery

Clayton (Day)

Workload requirements

Three 1-hour lectures and one 2-hour support class per week

Unit relationships

Prerequisites

MTH1020 or VCE Specialist Mathematics units 3 and 4 with a study score of at least 30

Prohibitions

ENG1005, ENG1091, MTH1035

Co-requisites

None

Chief Examiner(s)

[Associate Professor Burkard Polster](#)
[Dr Simon Teague](#)

Unit Coordinator(s)

[Associate Professor Burkard Polster](#)

Lecturer(s)

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Name: Dr Santiago Barrera Acevedo
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Phone:
Email: Santiago.Barrera.Acevedo@monash.edu

Academic overview

Learning outcomes

On completion of this unit students will be able to:

1. Understand the basic concepts of linear algebra, recognise and manipulate elements of vector spaces;
2. Formulate and solve equations involving vectors and matrices, including for three-dimensional geometry;
3. Identify and evaluate improper integrals;
4. Solve simple first and second order differential equations, and formulate them for applications to physical systems;
5. Compute Taylor series expansions, with remainder, for functions of one variable;
6. Apply Taylor series and l'Hopital's rule to compute limits;
7. Understand and compute the convergence properties of infinite series;
8. Provide written reports that contain complete mathematical arguments.

Teaching approach

In MTH1030 there will be 5 contact hours per week:

• Three one-hour lectures per week.

• One two-hour support class per week

Lectures

The material in lectures will be presented by hand – a live human will create real mathematics before your eyes.

The material presented in each lecture will be drawn from a set of lecture notes that will be available on the unit's Moodle website.

Our lectures will be recorded (audio + (usually) both the projected screens) and the recordings will be available via a link on the unit's Moodle website. It sometimes happens that lectures do not end up being recorded because of technical issues.

Support classes (also sometimes referred to as tutorials or lab classes)

The **methods** required to be able to actually do mathematics is the focus of the 2-hour support class in MTH1030. Whereas the lectures cover motivations, theory, proofs, applications and some examples, the support classes will be on the functional side of mastering techniques and notations. They are typically brief high-powered bursts of information that students are then expected to be able to use to relate to different problems in their own study time. The problems sets for MTH1030 (also available on the unit's Moodle website) will be the primary source material for these classes.

Communication of Mathematics

In this unit we will also pay a great deal of attention to how well mathematics can be communicated. Becoming familiar with the logic, language, formalisms and notation of mathematics is a challenge and will require some effort. You will be provided with examples of good communication in the notes and during lectures/support classes to guide you in this endeavour. Of course if you already have good habits and organisation then all this is so much easier to master!

Attention to detail in what you are saying is essential as mathematics has a concise syntax that can have quite different meanings attached to marginally different propositions. You will have plentiful opportunities to improve your mathematics expression throughout the course.

Talking to the lecturers and other students should be something you practice regularly because often what you think you know on paper is actually quite different to that which you verbalise. Many times it won't be until a person clearly articulates an idea that they truly understand it.

Be prepared to write or come up with solutions in small groups on the boards as this will also give confidence in skills and communication as the course progresses.

You can also find information on inclusive teaching practices for students with learning disabilities or mental health conditions at: www.monash.edu.au/lls/inclusivity/

Feedback to you

The feedback you will receive during your university studies is probably quite different from what you have been used to in school. The first big difference is the huge number of students undertaking each unit, which does not allow for the same one-on-one interaction as when you learn in small groups. Secondly, university students are adults and hence are expected to take responsibility for their own learning (spoon feeding is now in the past!)

However, you will still receive plenty of feedback on your progress, but you must look for it! In MTH1030, the following opportunities should help you get a sense of how you are doing:

Lectures and support classes

Lectures are not just a one-way street – you are actively encouraged to ask questions during and after the lectures. If there is some point that you feel unsure about don't be shy, ask the lecturer to clarify the point. The same is true for the support classes.

Assignments and test

Always look through the marked assignments, and read the comments given by your support-class leader either written on the assignment itself or in class to the whole group. Always ask if there is something that is not clear to you.

Assessment summary

Examination (2 hours): 60% (Hurdle)
Continuous assessment: 40%
Hurdle requirement: To pass this unit a student must achieve at least 50% overall and at least 40% for the end-of-semester exam.

Assessment task	Value	Due	Submitted via:
Assignment 1	8.75%	Wednesday, 23 August	Assignment box
Assignment 2	8.75%	Wednesday, 13 September	Assignment box
Assignment 3	8.75%	Wednesday, 4 October	Assignment box
Test	8.75%	In your lab class in the week starting 4 September	In lab class

Regular attendance and participation in the support classes is worth another 5%; details under "Examination" below.

Lab classes

You should allocate yourself to a lab class through ALLOCATE+. In the first two weeks of classes, all timetable issues need to be resolved by sending an email to allocate@sci.monash.edu.au. The teaching staff cannot make changes to your allocation. After the second week, see the Reception

Office of the School of Mathematical Sciences (4th floor, building 28) for any changes to the lab class allocation. It is your responsibility to be properly enrolled in the lab class you attend, as otherwise your semester marks may be displaced.

Assignments

Format

To get full marks your assignment

1. must be neatly presented, but does not necessarily have to be typed;
2. must not contain any mistakes (mathematical, logical, spelling, etc.);
3. must be self-contained, including the statement of a problems at the beginning, and answers to whatever questions were asked at the end;
4. must be understandable without too much effort by other students taking this course;
5. must contain a clear description of the mathematics that justifies everything you do in **full English sentences**.

A lot of this is about the way you present your work. Just to put a figure to it, you can lose up to 30% of the total marks for poor presentation. In particular, if your handwriting is illegible, whatever you are writing about will not be counted. If you have problems in this respect you may want to consider typing everything up after all.

Assignment submission

You must submit your assignments to your support-class leader in hardcopy form by 5 pm on the day that an assignment is due. To submit an assignment, either hand it to your support-class leader during one of your lab classes or deposit it in his or her assignment box on the ground floor of the maths building (building 28). Note that you won't be able to find your support-class leader's assignment box unless you know their name (ask them or find out on ALLOCATE+!) Also, if you do not submit your assignment in the correct assignment box, your assignment will not be marked and you will receive 0 marks on your assignment!

The submission dates are clearly stated on each assignment and in this unit guide. All assignments will be available for download from the website three weeks prior to their due date.

It is strongly recommended that students make a copy of the final version of their assignments prior to its submission, for example with their phone or using a scanner.

Students who have attempted this unit previously must complete all assessment tasks again. No marks can be carried across from a previous enrolment in the unit.

Extensions, late submission and penalties

The penalty for assignments submitted late is 10 marks per day late or part thereof. Weekends and holidays attract the same penalty as weekdays. No assignment can be accepted for assessment more than eight days after the due date except in exceptional circumstances and in consultation with the unit coordinator. Late assignments can be e-mailed to the unit coordinator.

If you have any valid reason why you are unable to submit your assignment by the due date you must contact your unit coordinator before the due date. In all other cases late penalties will apply (see below).

The process for submitting special consideration applications for missing due dates is outlined below.

Support-class leaders are not authorised to approve extensions to deadlines.

Please make sure to submit your own work. It is okay, and we even encourage you to discuss a problem with other students who are taking the course to try to understand how to attack it (and to avoid going completely off the mark). However, in the end you have to do your own calculations and you have to write up your own report in your own words.

Monash University is very picky about this last point and, to make sure that you understand how serious this is, requires that you attach a completed assignment cover sheet to the front of your assignment. Make sure that you understand what you are signing there. You can download a copy of the coversheet from the unit's website.

Returning marked assignments

Whenever possible marked assignments will be returned to you within two weeks after they were due. Your marks will also be posted in the Grade Book on Moodle at around the same time and you should check these have been recorded correctly. If any of them have been entered incorrectly you must query them with your support-class leader in a timely manner. (If work is consistently being handed back late to you, or your marks are not posted on Moodle within a week of receiving your marked work, please advise the unit coordinator.) If you are unable to collect your work at the usual class, please ask your support-class leader at the next class. Any uncollected work after the end of semester can be retrieved from the unit coordinator up until the end of the examination period.

If you believe that an error has been made in the marking of any assessment, for example missed working or a mistake in the addition of marks, you should discuss that with your support-class leader initially. If you are not satisfied with their response you should contact the unit coordinator.

Resubmission of assignments

You will normally not be allowed to re-submit your work for assessment except in exceptional circumstances and only with written consent of the unit coordinator.

Examination(s)

Final Exam (60% of final mark)

The final exam will run for three hours. A mock exam with solutions will be made available on the unit web site towards the end of the semester.

No calculators, textbooks or notes of any kind will be allowed in the test or in the exam. You will be provided with a formula sheet as part of the test and the exam and a copy of this formula sheet will be also be available on the unit web site from around the middle of the semester.

The final exam is a hurdle for this unit. To pass this unit a you must achieve at least 50% overall and at least 40% for the end-of-semester exam.

Midsemester test (8.75% of final mark)

There will be a test towards the middle of the semester that will be held during one of your lab classes. It will give you a taste for what to expect in the final exam.

Three assignments (3 x 8.75% of final mark)

Format

To get full marks your assignment

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Resubmission of assignments

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Support classes (participation in these is worth 5% of final mark)

You should allocate yourself to a support class through [ALLOCATE+](#). In the first two weeks of classes, all timetable issues need to be resolved by sending an email to [allocate@sci.monash.edu.au](#). The teaching staff cannot make changes to your allocation. After the second week, see the Reception Office of the School of Mathematical Sciences (4th floor, 9 Rainforest walk/building 28) for any changes to the support class allocation. It is your responsibility to be properly enrolled in the support class you attend, as otherwise your semester marks may be displaced.

You can get a total of 100 marks for participation in support classes. 70 out of those 100 marks you get for being present for the full duration of at least 8 of the 12 support classes. You will get none of these 70 marks if you attend less support classes without a valid (in the usual sense) reason. If you miss one of your support classes the only way you can make up for it is by attending another support class during the same week, just let the support class leader in charge know.

You will get up to 30 marks at the discretion of your support class leader for participating in disscussions, answering questions, etc. during support classes.

Applications for special consideration

Students with a valid reason for late submission of an assignment, or for missing a quiz or mid-semester test, must provide the unit coordinator with originals of appropriate documentation within two working days of the normal deadline for that piece of work. This application must be submitted

directly to the unit coordinator in bldg. 28, room 411 (or slip them under the door if there is nobody in the office at that time). The unit coordinator will advise you of the outcome of the application by email.

See also http://www.monash.edu.au/exams/special-consideration.html for university information.

Unit schedule

The table below shows the planned schedule of activities and assessment for this unit but from time to time it may be necessary to adjust this for operational reasons. Please listen for announcements in lectures and/or check official announcements on Moodle regularly.

Week (starting)	Activities	Assessment
1 (24 July)	Linear algebra lectures + lab classes	
2 (31 July)	Linear algebra lectures + lab classes	
3 (7 August)	Linear algebra lectures + lab classes	
4 (14 August)	Calculus lectures + lab classes	
5 (21 August)	Calculus lectures+ lab classes	Assignment 1 due on Wednesday
6 (28 August)	Calculus lectures + lab classes	
7 (4 September)	Calculus lectures + lab classes	Test during lab classes
8 (11 September)	Calculus lectures + lab classes	Assignment 2 due on Wednesday
9 (18 September)	Calculus lectures + lab classes	
	Midsemester break	
10 (2 October)	Linear algebra lectures + lab classes	Assignment 3 due on Wednesday
11 (9 October)	Linear algebra lectures+ lab classes	
12 (16 October)	Linear algebra lectures + lab classes	

Your feedback to us

One of the formal ways students have to provide feedback on teaching and their learning experience is through the Student Evaluation of Teaching and Units (SETU) survey. The feedback is anonymous and provides the Faculty with evidence of aspects that students are satisfied with and areas for improvement.

Previous student evaluations of this unit

In response to previous SETU results of this unit, the following changes have been made:

More direct support for all aspects of this unit provided through the *Mathematics Learning Centre*.

If you wish to view how previous students rated this unit, please go to;
https://unitevaluations.connect.monash.edu.au/unitevaluations/index.jsp

Unit resources

Learning resources

Lecture notes/books

A complete set of lecture notes, written specifically for this unit will be available from the unit web site. The lecture notes we provide are very comprehensive. This means that you do not need to buy a textbook.

You should be fine just reading the lecture notes. However, if you find some parts of the lecture notes hard to understand you may also want to consult some websites and books dealing with material similar to that covered in our course. In general, the Wikipedia pages dealing with mathematical topics are excellent and so are the Mathworld pages hosted by Wolfram Research. There are also lots of good books on linear algebra and calculus in the library. Two books we particularly recommend and which are used in more advanced units here at Monash are the following:

Anton & Rorres, Elementary Linear Algebra, 11th Edition, Wiley (2014).

and

Stewart, Calculus, Early Transcendentals Version 6 or 7 (2008, 2012)

You can purchase these books from the Monash bookstore and there are a limited number of copies in the library.

Unit website

Unit information, lecture notes, assignments, exercises, all handouts and notices will be available on the web through Moodle (click here).

Mathematics Learning Centre

The School of Mathematical Sciences also operates a *Mathematics Learning Centre,* to provide additional assistance to students who are encountering difficulties with lecture material and exercises in any of their first and second-year mathematics units (including MTH1030).

The Mathematics Learning Centre is located on the ground floor of 9 Rainforest walk/building 28, room G24 at the Clayton campus and it is open from week 2 of the semester, Monday to Friday, 11am - 2 pm. No appointment is necessary.

Monash Library Unit Reading List (if applicable to the unit):
http://readinglists.lib.monash.edu/index.html

Required resources

Students generally must be able to complete the requirements of their course without the imposition of fees that are additional to the student contribution amount or tuition fees. However, students may be charged certain incidental fees or be expected to make certain purchases to support their study. For more information about this, refer to the Higher Education Administrative Information for Providers, Chapter 18, Incidental Fees at http://education.gov.au/help-resources-providers

Technology requirements

You must check Moodle site for this unit regularly for any announcements and should act upon that information. You are also expected to access the online resources provided for this unit in a timely manner. If you do not have your own computer, you have access to computers via the Monash Library, at an open-access computer laboratory, or at the Mathematics Learning Centre in room G24, 9 Rainforest Walk (Building 28).

We will be using the program Mathematica. Please read through the relevant section on the Moodle site to find out how to get access to this program and how to use it.

Other information

Policies

Monash has educational policies, procedures and guidelines, which are designed to ensure that staff and students are aware of the University's academic standards, and to provide advice on how they might uphold them. You can find Monash's Education Policies at:
http://www.policy.monash.edu/policy-bank/academic/education/index.html

Graduate Attributes Policy

http://www.monash.edu/policy-bank/academic/education/course-governance-and-design/course-design-policy

Student Charter

http://www.monash.edu/students/policies/student-charter.html

Student Services

The University provides many different kinds of services to help you gain the most from your studies.Contact your tutor if you need advice and see the range of services available at: http://www.monash.edu/students

http://www.monash.edu.my/student-services/

Monash University Library

The Monash University Library provides a range of services, resources and programs that enable you to save time and be more effective in your learning and research.

Go to http://www.monash.edu/library or http://www.lib.monash.edu.my/ or the library tab in http://my.monash.edu portal for more information.

Disability Support Services

Students who have a disability, ongoing medical or mental health condition are welcome to contact Disability Support Services.

Disability Support Services also support students who are carers of a person who is aged and frail or has a disability, medical condition or mental health condition.

Disability Advisers visit all Victorian campuses on a regular basis.

- Website: monash.edu/disability
- Telephone: 03 9905 5704 to book an appointment with an Adviser;
- Email: disabilitysupportservices@monash.edu
- Drop In: Level 1, Western Annexe, 21 Chancellors Walk (Campus Centre) Clayton Campus

For students at Malaysia campus, please contact the Student Wellbeing and Activities Office located in Building 2, Level 2, Room 2238.
http://www.monash.edu.my/student-services/wellbeing-and-activities/disability-support

Plagiarism, cheating and collusion

Monash University has strict policies on plagiarism, cheating and collusion, and the penalties can be severe. Full details of the policy can be found at:
http://www.policy.monash.edu/policy-bank/academic/education/conduct/student-academic-integrity-policy.html

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