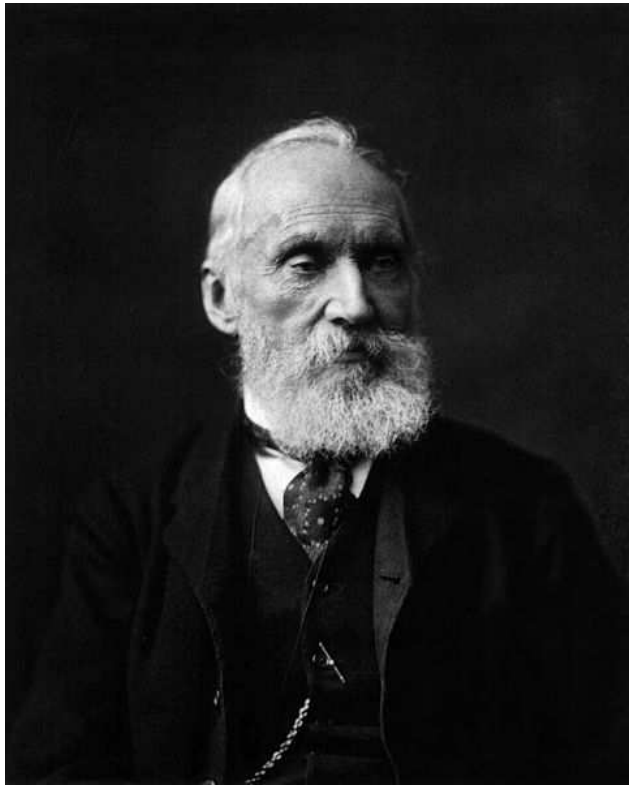


When you can measure what your are speaking about and express it in numbers, you know something about it, but when you cannot measure it, when you cannot express it in numbers, your knowledge is of a meagre and unsatisfactory kind.

William Thomson, 1st Baron Kelvin, (1824 –1907)

mathematical physicist and engineer.

General information

WELCOME to MATH1131!

- MATH1131 is a 6 unit of credit course offered in terms 1, 2 and 3.
- - **Calculus**
    Lectures, classroom tutorials, online tutorials
    This might look familiar but there's lots that's new.
  - **Algebra**
    Lectures, classroom tutorials, online tutorials
    Linear Algebra will be mostly new to NSW students.
  - **Maple coding**
    Online tutorials
    Using a computer to solve maths problems is an essential skill.
- The pace is very fast. It's very important to keep up to date.
- These slides and a introductory video are on Moodle.

Website/Moodle/Email

- The School of Mathematics and Statistics website

  www.maths.unsw.edu.au

  has lots of useful information on
  - courses
  - how to get help
  - school policies (assessment, special consideration etc)
  - our research
- Information about this course in this term is on Moodle

  moodle.telt.unsw.edu.au
- Regularly check your UNSW email, eg,

  `z1234567@unsw.edu.au`

  Use it to communicate with us and always quote your student ID.

Assumed knowledge

- The assumed knowledge for MATH1131 is HSC Mathematics Extension 1 with a combined mark of at least 100/150.
  (HSC Mathematics students with $> 85/100$ should be OK.)
- Unsure? Try the self-assessments on the UNSW TestMe site.
  testme.unsw.edu.au
- www.maths.unsw.edu.au/currentstudents/revision-worksheets

- Insufficient preparation? Consider...
  - MATH1011 in term 1
    (as possible elective and co-requisite for PHYS1121)
  - MATH1131 in term 2 and MATH1231 in term 3
- For advice, contact FY.MathsStats@unsw.edu.au

Classes — see Moodle and myUNSW for details

- **Lectures**
  - Weeks 1–5, 7–10 have 5 lectures per week. Week 6 has 3.
  - Lecture materials, lecture recordings, etc... are on Moodle.
- **Classroom tutorials**
  - One Classroom Tutorial each week starting in week 1.
  - See Moodle for a list of suggested problems to prepare before your Classroom Tutorial.
  - Location may change. Check myUNSW before your first tutorial.
- **Online Tutorials**
  - Online Tutorial due 1pm each Monday in weeks 2 to 11 (not week 6).
  - Do not leave your Online Tutorial until Sunday night!

Course pack and textbook

- You are recommended to buy the course pack from the UNSW book shop. The course pack is also available for download from Moodle.
  - Course outline — essential information about this course
  - Algebra notes — complete course notes and tutorial problems
  - Calculus notes — complete course notes and tutorial problems
  - First Year Maple Notes — complete notes for Maple coding
  - Past exams with solutions
- A second hand course pack is OK if you obtain the latest course outline from Moodle.
- The calculus textbook (Salle, Hille and Etgen) is not essential. Wait a couple of week to decide whether you want this.

Assessment

Details are on Moodle

- Online Tutorials
  - Weekly Online Tutorials (10%)
- Lab Tests (2) in weeks 4–5 and 8–9 (15% + 15%)
  - Book a time for your lab tests by the end of weeks 3 and 7
- Assignment (10%)
  - Must be typed and will emphasise mathematical writing and arguments over calculations
  - Released in week 5
  - Due 5pm Friday of week 7
- Final exam (50%)

Special consideration

- If you miss an assessment due to illness or misadventure you must apply for special consideration through myUNSW within 3 days.
- You must provide suitable documentation (eg a medical certificate) and have it verified at Student Central.
- Weekly Online Tutorials are already very flexible and special consideration for these is usually not granted.
- For details see
  - Course outline
  - student.unsw.edu.au/special-consideration
    www.maths.unsw.edu.au/currentstudents/special-consideration-illness-misadventu

Getting help

Seek help as soon as you need it!

- Help with course work:
  - Maths Drop-in Centre (RC-3064)
  - Staff consultation (posted on Moodle week 2)
  - Moodle forums
  - Lab consultants
- Administrative and academic advice
  - ug.MathsStats@unsw.edu.au
  - Director of First Year: A/Prof Jonathan Kress, RC-3073
  - Student Services: Ms Markie Lugton, RC-3072
- Counselling Services: student.unsw.edu.au/counselling

Some advice

- Maths is all about understanding concepts, analytical thinking and problem solving...
- Work in teams
- Keep up with lectures (slide notes, lecture recording)
- If you don't understand something in lecture, **ASK** (during lectures, consultation time etc...)
- Ground rule: "Mature, responsible behaviour" and ENGAGE!

- **Don't freak out if it seems overwhelming at first**
  don't get too confident if it seems too easy at first

CALCULUS Introduction

Lecturer Amandine Schaeffer
a.schaeffer@unsw.edu.au, Red Center R-4102

Lectures:
Mondays 2-3pm, Tuesdays 5-6pm (weeks 2+4+7+9) & Thursdays 4-5PM

MATH1131

UNSW

Term 1 2020

What is calculus?

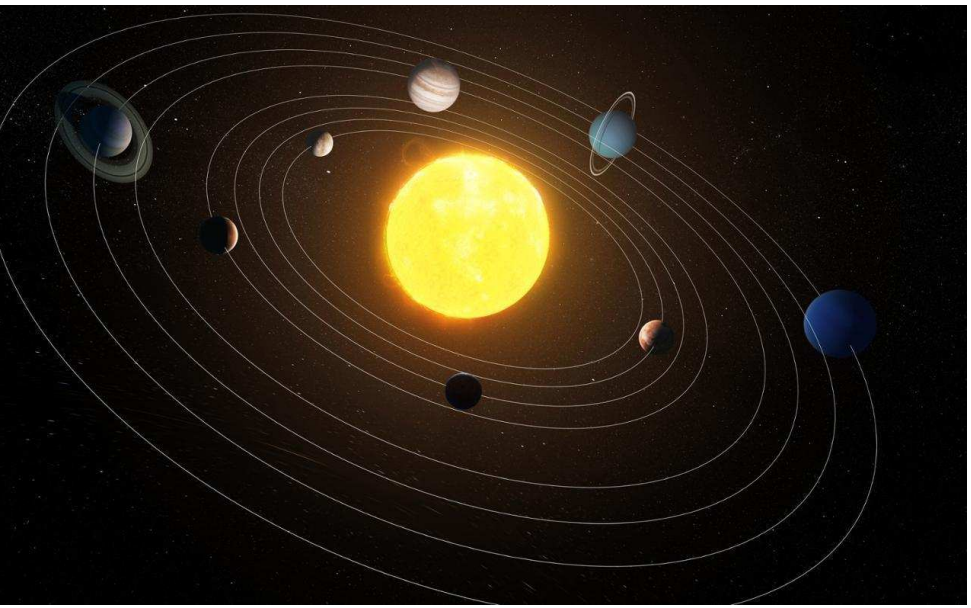
Calculus is the study of how things change.

- Examples: calculating gradients of curves, instantaneous velocity, area of regions, volumes, work done by a force, centre of mass of solids etc...

What is calculus?

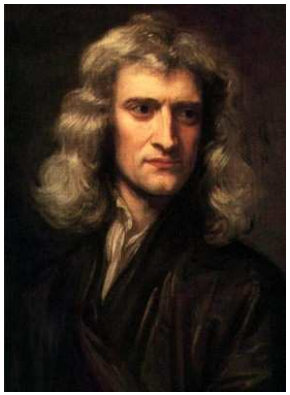
Calculus is the study of how things change.

- Examples: calculating gradients of curves, instantaneous velocity, area of regions, volumes, work done by a force, centre of mass of solids etc...
- calculus originates from describing basic physics:
  - motion of planets and molecules
  - behaviour of dynamical systems



Calculus is the study of how things change.

- Two major branches:
  - *differential calculus* (chap. 4)
  - *integral calculus* (chap. 8)
    ... related by the *Fundamental Theorem of Calculus*
    Underlying tools: *functions* (chap 1.) and *limits* (chap. 2).
- Godfathers of modern calculus:



Sir Isaac Newton (1642 –1727) English physicist, mathematician, astronomer, natural philosopher, alchemist.

Gottfried Wilhelm Leibniz (1646 –1716) German mathematician and philosopher.

Applications:

Engineering, physics, chemistry, biology, geology, surveying, sociology, economics, statistics, (physical oceanography) etc....