

MATHS FOR ENGINEERS

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Foundation

- Maths is the foundation unit for all courses in science and engineering
- Engineering physics which relies on a good maths background is a foundation unit for all engineering disciplines
- Lack of good maths background and knowledge affects all engineering disciplines
- Problem not new. Ongoing for last ten years

The issue

- Knowledge of maths ranges from HSC maths to Year 10 maths
- Over 30% of students enrolling in Engineering degree at UWS have poor background in mathematics
- Mathematics is not a prerequisite for Engineering studies at UWS

Impact

- Over 40% of students fail Engineering Maths
- Impacts on grades for first year engineering units
- Failure rate:

Fundamentals of Mechanics 33%

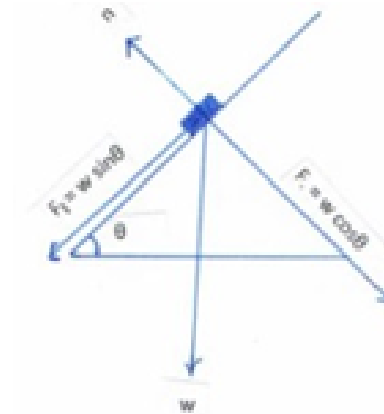
Electrical fundamentals 24%

Engineering physics 12%

Failure may be compounded by lack of understanding the engineering units as well

Areas of deficiency

- Weaknesses in background knowledge to solve engineering problems:
- Simultaneous equations
- Applications of trigonometrical functions
- Application of $\sin \theta$ and $\cos \theta$ to find components of forces
- Application of log and exponential functions
- Simple differentiation and integration, etc



Components of forces

Difficulty in translating maths

knowledge to eng problems

Some solutions used in engineering physics

* Just in time maths

Spend 15-20 minutes on the maths before teaching engineering topics. For example, revise the maths first then derive equation for standing waves.

Revise maths: ()

Derive equation.

- () () ()
() ()
- () () (standing wave on a string, fixed end at $x = 0$)

Some solutions used in engineering physics

- **Use maths as tool (e.g. for differentiation & integration)**
- Use maths as a tool: Feynman Lectures in physics.
- Just show the method. Mechanical.
- Differentiation: , —
- Integration: —

etc

* **Resource book**

Writing resource book to show how various parts of maths used to solve engineering problems.

Support for students

Mathematics Education Support Hub (MESH)

HOW CAN MESH HELP YOU?

- **Events, workshops and programs** – various mathematics and statistics workshops are held throughout session
- **Online tutoring** – access online tutoring, I Don't Get It, through the MESH site
- **Assistance at libraries** – MESH staff visit libraries. Look out for the MESH team – they will be wearing bright orange T-shirts
- **Modules to assist with particular courses** – courses include Accounting, Biology, Chemistry and Nursing
- **Maths Start courses** – develop your maths and stats skills before session begins
- **Improve Your Maths** – revise your mathematics and statistics skills using online videos, quizzes and worksheets.



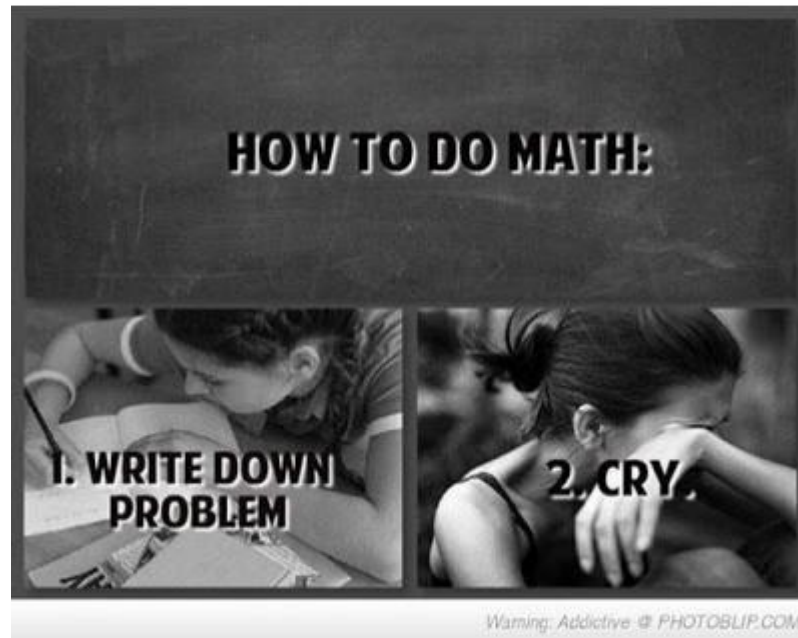
For more information **Web:** www.uws.edu.au/mesh **Email:** mesh@uws.edu.au

Curriculum renewal

- Integration of first-year first session units
- Revision of the engineering mathematics units
 - ‘How do I take in and express ideas?’
 - ‘How do I prove it?’
 - ‘What do I bring to this process?’
 - ‘How do I measure, compare or represent it?’
 - ‘What are other people’s perspectives on this?’

http: www.bigpicture.org/schools/learning-goals

No more....





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