Division of Applied Mathematics

TWB252: Applied Mathematics for Civil Engineers

Course Information 2017

Lecturer

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Prescribed textbook

DG Zill & WS Wright, Advanced Engineering Mathematics, Jones and Bartlett, 5th Ed, 2014.

Lectures and tutorials

	Day	Time	Venue
Lecture	Monday	08:00	E202
Lecture	Tuesday	11:00	A303A
Tutorial	Wednesday	08:00-09:00	A204

An assignment will be made available online before each tutorial session. You write a short tutorial test towards the end of the relevant session. Each assignment and tutorial test cover the work discussed during the preceeding lectures. The first tutorial session is on 26 July 2017.

Web page

Course documentation is at http://appliedmaths.sun.ac.za/TWB252

Assessment

This module uses the **"Flexible Assessment"** method, as applied in the Engineering Faculty. For details, please refer to the Faculty's Assessment Rules, which is available on the TWB252 web page.

The dates and times below for the three main assessment opportunities (A_1, A_2 and A_3) are subject to change. Please verify this information online before you pitch up for an assessment opportunity!

Opportunity	Date	Time
A_1	Friday, 1 September 2017	08:00
A_2	Thursday, 9 November 2017	09:00
A_3	Tuesday, 28 November 2017	09:00

The average mark of the tutorial tests (which are written weekly) constitutes the **semester mark** (SM). In the formulas below w_{SP}, w_{A_1} and w_{A_2} represent the weighting factors for the composition of the **final mark** (FM). For this module the weighting factors are as follows:

$$w_{SM} = 0.12; \quad w_{A_1} = 0.38; \quad w_{A_2} = 0.50$$

SM, A_1, A_2 and A_3 represent the respective marks (each out of 100) that were achieved for the semester mark and the three main assessments.

- For students who did A_1 and A_2, but not A_3, the provisional FM (FM_p) is given by:

$$FM_p = w_{SM} \cdot SM + w_{A_1} \cdot A_1 + w_{A_2} \cdot A_2$$

- For students who missed either A_1 or A_2, and therefore did A_3, the provisional FM is calculated using the above formula, except that A_3 is used instead of the missed assessment. The weighting factors are not adjusted.
- For students who did A_1, A_2 and A_3, the provisional FM is calculated using the above formula, except that A_3 replaces A_1 (if $A_1 < A_2$) or A_2 (if $A_1 \geq A_2$), with the provision that FM_p must not be reduced when taking A_3 into account. The weighting factors are not adjusted..
- If $FM_p \geq 50$, all applicable subminima have been met, and only two of A_1, A_2 and A_3 were done, then $FM = FM_p$.
- If $FM_p \geq 50$, all applicable subminima have been met, and A_1, A_2 and A_3 were *all* done, then $FM = 50$.

Not that $A_2 \geq 50$ or $A_3 \geq 50$ are not necessarily sufficient to pass the module and that $A_1 \geq 40$ is not required to have access to A_2.

The following subminimum is applicable: If a student has not achieved at least 40 in A_2 or A_3, then his/her FM may not exceed 45.

All students registered for the module has access to A_1. A student only has access to A_3 if he/she has submitted an acceptable excuse (for example medical certificate or a letter of excuse from the Registrar) for A_1 or A_2, or if he/she has achieved $FM_p \in [40, 50]$ after completion of A_2. A_3 also serves as sick-assessment for either A_1 or A_2.

Note that a student may not take a "deference", i.e. he/she may not choose to miss A_2 and rather write A_3.

Preliminary planning

First Order Ordinary Differential Equations [±4 weeks]
• Section 1.3: Differential Equations as Mathematical Models
• Section 2.7: Linear Models
• Section 2.8: Non-linear Models

Second Order Ordinary Differential Equations [±4 weeks]
• Section 3.8: Linear Models: Initial-Value Problems
• Section 3.9: Linear Models: Boundary-Value Problems
• Section 3.11: Non-linear Models

Partial Differential Equations [±4 weeks]
• Sections 13.1 to 13.5: Classical Equations and Boundary-Value Problems

Outcomes

After the completion of the module, the student will be able to implement the mathematical modelling process on a variety of applied problems. That is:

• The problem has to be identified correctly and the necessary assumptions have to be specified.
• The problem must subsequently be formulated in terms of one or more differential equations.
• After this, a correct solution of the mathematical formulation has to be found.
• Finally, the solution has to be interpreted in terms of the initial problem.
• Whenever the gap between the model and practice is too large, improved assumptions have to be attempted.

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