MATH 0390: Foundation Pure and Applied Mathematics

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- **Lectures/tutorials (all compulsory)**

    – Monday 13:00–14:00, Chemistry Lecture Theatre B (2.17) (Tutorials in Weeks 2-6 + 8-11, see below).
    – Wednesday 10:00–11:00, Roger Stevens Lecture Theatre 17.
    – Friday 16:00–17:00, Roger Stevens Lecture Theatre 19.

    If you arrive late for a lecture or tutorial, please use the side doors, do not walk across the front of the class.

    Full lecture notes and example sheets will be put on Minerva/VLE in due course; paper copies will not be distributed. During lectures, this material will be presented and explained. Check regularly the course page on Minerva/VLE where annoucements and information will be posted. You will probably want to take additional notes during the lectures, but you may not need not write everything (since the material is also in the online notes).

- **Tutorials** On Mondays of Weeks 2 to 6 and 8 to 11, there will be weekly one-hour tutorial session during which tutorial questions will be discussed. There will be no tutorial in Week 7.

    – Weeks 2–6: Tutorial on Monday from 13:00–14:00, Chemistry Lecture Theatre B (2.17).
    – *No tutorial in Week 7: There will be regular lectures on Monday 11/11 and Friday 15/11, and a midterm test on Wednesday 13/11, see below.*
    – Weeks 8–11: Tutorial on Monday from 13:00–14:00, Chemistry Lecture Theatre B (2.17).

    In principle, no course material will be lectured during what is supposed to be a tutorial session. However, it may occasionally happen that a short part of a tutorial session can be used to complete or briefly revisit some aspects of a lecture. During tutorials, we will discuss tutorial (practice) questions that will help you do the homework assignment. You are expected to try the tutorial questions by yourself. There is one set of tutorial questions along with each set of homework questions (see below).

- **Office hour**. My office hour is from 11:15-12:15 on Fridays during the teaching weeks. You are welcome to visit me in my office during that hour (no appointment needed).

Assessment

- There will be a 2 hour exam in January, accounting for 85% of the final grade.

- *Note that exam rules have recently changed: all exam questions will be compulsory which means that you will be asked to attempt all questions.*

- There will be a **midterm test** on Wednesday 13th November (Week 7) on the material (lectures + homeworks & tutorial questions) covered in from 30th September 2019 - 11th November 2019 (inclusive). The midterm test is an in-class assessed individual piece of work that counts for **5% of the final grade**. *More info about the midterm test in due course.*

- There will be **9 example sheets**, each containing a series of homework and tutorial questions. The homework questions are individual assignments and need to be submitted in writing. They should reflect your personal work and will be individually marked (allocated marks are indicated on each example sheet). Together, the *9 homework assignments* account for **10% of the final grade**. *Your coursework's grader is* **Dr Stephen CHAFFIN**. The practical organisation with the example sheets and homeworks/tutorials is summarised in this chart:

Example sheet N.	1	2	3	4	5	6	7	8	9
Available on (Thursdays)	03/10	10/10	17/10	24/10	31/10	07/11	21/11	28/11	05/12
Tutorial (Mondays)	07/10	14/10	21/10	28/10	04/11	18/11	25/11	02/12	09/12
Deadline (Thursdays, 1pm)	10/10	17/10	24/10	31/10	07/11	21/11	28/11	05/12	12/12

For example, homework 2 will be posted on Minerva/VLE on Thursday in Week 2 (on 10/10), will be discussed during Tutorial 2 on Monday 14/10 in Week 3, and is due by 1pm on Thursday 17th October in Week 3.

Written homework should be submitted to the pigeon hole of **Stephen Chaffin** (MATH0390 grader) on level 8 of the School of Mathematics. Late homework should be delivered to my office – hand it to me in person, or slide it under my door. *Do not submit late homework to my pigeonhole*. In principle, late homeworks are penalized:
For homeworks 1-8: Marks will be reduced by 25% for homeworks submitted after 1pm on Thursday but within 24 hours after the deadline. For homeworks 1-8 that are submitted more than 24 hours after the deadline but before 1pm the following Monday, marks will be reduced by 75%. No marks will be awarded to homework submitted after 1pm on the Monday following the deadline since the homework solutions will then be available.
Homework 9 is due on Thursday 12/12 by 1pm and solutions will be posted on Minderva/VLE on Friday 13/12/2019 at 5pm. Marks to late homeworks 9 submitted after 1pm on 12/12 but before 5pm on 13/12 will be reduced by 50%. No marks will be awarded to late homeworks 9 submitted after 5pm on 13/12/2019.

Contact me (preferably via e-mail) if you need an extension for your homework due to illness or other issues. This must be done *before* the day of the submission deadline; extensions can be granted afterwards only in very exceptional circumstances.

Course information

Information (example sheets and solutions, homework assignments, lecture notes, announcements, and homework marks) will be added to the dedicated course page at Minerva/VLE Blackboard accessible via: `https://minerva.leeds.ac.uk/`

Course content

1. **Linear and quadratic relations**: Equations for straight lines; intersection of two lines. Linear relations to model socio-economic scenarios: supply and demand; equilibrium price. Quadratic relations and revenue optimisation.

2. **Indices and powers**: Index laws; examples and applications.

3. **Exponential and logarithm functions**: Definition and graphs of exponential functions; the number e and its exponential; definition and graphs of logarithm functions. Logarithm laws and relationship between exponential and logarithm functions; applications.

4. **Percentages, geometric series, and applications to interest & savings**: Percentages; growth and decay. Simple and compound interest; discounting. Geometric series and application to regular savings.

5. **Differentiation and applications**: Differentiation from first principles and slope (gradient) of a curve. Tangents and normals to a curve. Maxima and minima of a function; stationary and turning points; distinguishing maxima and minima; application to profit maximisation.

6. **Integration and applications**: Integration as the reverse of differentiation, indefinite integral. Integration as a summation; definite integral and area under the graph; application to consumer surplus.

Reading list

The lecture notes will be sufficient to complete the homework and to revise for the exams. However, you may find it helpful to use books for alternative explanations of difficult concepts, worked examples, practice questions, or other additional material. Some useful books for this course are:

- **Mathematics for Economics and Business**, by Ian Jacques (Prentice Hall, 2006).

- **Essential mathematics for economic analysis**, by Knut Sydsaeter and Peter Hammond (Prentice Hall, 2008). (Earlier editions of this book have a slightly different title: **Mathematics for Economic Analysis**.)

- **Essential mathematics for economics and business**, by Teresa Brandley (Wiley, 2013).

Note that you can of course also use other/later editions of the above books.
Many useful resources can also be found on-line: see, e.g., http://www.mathcentre.ac.uk/.