network for excellence
sigma Σ
in mathematics & statistics support

The Maths Help Tutor's Pocket Guide to Resources

De Montfort University and Sheffield Hallam University

Table of Contents

Introduction

This booklet provides information of some books, online resources and software that are useful in a maths help and support environment. The resources (paper-based and online) included are those used by and recommended by maths tutors. It isn't comprehensive and we are always looking for more to add, so if you spot and error or have a suggestion or two please email us chetna.patel@dmu.ac.uk.

Resources - Books

Technician Mathematics 1

Bird, J. O. and Bird, B.

Harlow: Longman Scientific & Technical.

1998 3rd edition

From the publisher: *This book 1 in a series of 5 deals with the fundamental mathematics that are essential for science disciplines. Aimed at vocational students it starts with arithmetic operations and cover GCSE material. This third edition has been revised and expanded to cover all the mathematics requirements of engineering-based BTEC First Certificate and Diploma courses, as well as NVQ and GNVQ courses. It is also a valuable reference for final year GCSE students who want to progress in engineering and science.*

Consolidates basic mathematical principles and establishes a common base for further progress. Accessible approach assumes little previous knowledge of each topic. Covers the wide variety of approaches to maths up to Level 2. Improves understanding with nearly 400 detailed worked problems and 750 further problems with answers. Maths for BTEC and vocational courses. The level is suitable for any student needing to be comfortable with GCSE level maths.

Positives: It gives good explanations as to the relevance of the topics. The worked examples give useful and easy to follow information. Recommend particular sections to students; Use for own reference. It an old book but covers topics thoroughly.

Negatives: Format is linear, lacks highlights to distinguish and get to key points

---

Technician Mathematics 2

Bird, J. O. and Bird, B.

Harlow: Longman Scientific & Technical.

1998 3rd edition

From the publisher: *This book 2 in a series of 5 deals with the fundamental mathematics for technicians introduces engineering context to the maths. Aimed at BTEC students it covers GSCE and A Level maths material. Together with Technician Mathematics 3, this third edition has been revised and expanded to cover the BTEC Mathematics for Engineers module for National Certificate and Diploma. It is also suitable for NVQ and GNVQ courses, and is a valuable reference for GCSE Mathematics students.*

Consolidates basic mathematical principles and establishes a common base for further progress. Includes coverage of simple engineering systems, generation of numerical values for system parameters, manipulation of data to determine system response in defined conditions, and evaluation of system effects from changes in variables. Increases

understanding with over 250 detailed worked problems — plus 800 more problems complete with answers.

Positives: It gives good explanations as to the relevance of the topics. The worked and applied examples are good to develop use of the topics. It an old book but covers topics.

Negatives: Format is linear, lacks highlights to distinguish and get to key points

---

Technician Mathematics 3

Bird, J. O. and Bird, B.

Harlow: Longman Scientific & Technical.

1998 3rd edition

From the publisher: *This book 3 in a series of 5 deals develops mathematics for technicians and engineering. Aimed at HNC/HND level but covers year 1 engineering maths. Technician Mathematics 3 is the third in a highly successful series providing a simple, practical guide to the fundamental mathematical skills essential to technicians and engineers. Covers the BTEC Mathematics for Engineers module for National Certificates and Diplomas. Is suitable for University Engineering Access, NVQ and GNVQ courses, and is a valuable reference for A Level Mathematics students.*

Consolidates basic mathematical principles and applies mathematics to engineering problems. Includes coverage of simple engineering systems, generation of numerical values for system parameters, manipulation of data to determine system response in defined conditions, and evaluation of system effects from changes in variables. Contains nearly 400 detailed worked problems, plus 1400 more problems complete with answers.

Positives: The worked and applied examples are good to develop use of the topics at Year 1. It an old book but covers topics.

Negatives: Format is linear, lacks highlights to distinguish and get to key points

---

Technician Mathematics 4/5

Bird, J. O. and Bird, B. Harlow: Longman Scientific & Technical.

3rd

From the publisher: *This book4/5 in a series of 5 deals with the fundamental mathematics for technicians introduces engineering context to the maths. Aimed at BTEC students it covers GSCE and A Level maths material.*

Mathematics for Electrical Technicians 4/5 provides a simple and practical guide to the fundamental mathematical skills essential to technicians and engineers. This second edition has been revised and expanded to cover the BTEC Higher - 'Mathematics for Engineers' module for Electrical and Electronic Engineering Higher National Certificates and Diplomas. It will also meet the needs of first and second year undergraduates studying electrical engineering.

Positives: The worked and applied examples are good to develop use of the topics at Year 2. It an old book but covers topics.

Negatives: Format is linear, lacks highlights to distinguish and get to key points

---

Core Maths for 'A' Level.

Bostock, L. and Chandler, S.. Cheltenham: Trans-Atlantic Publications.
1994 2nd

Introduction:

From the publisher: *Written for the Edexcel Syllabus B and similar schemes offered by the major Awarding Bodies. The authors have incorporated many modern approaches to mathematical understanding whilst retaining the most effective traditional methods. Plenty of worked examples and stimulating exercises also support this highly popular text.*

Positives: Carefully written and thorough. Loads of exercises from past A-level papers. Useful for recapping Maths A Level

Negatives: Some rather strange examples. Has an unfocussed feel about it. Quite old

---

Applied Mathematics 1

Bostock, L., Chandler, S., Chandler, F. S. and Ch, United Kingdom: Nelson Thornes Ltd.
1975

From review on Amazon: *[T]he Miscellaneous Exercises at the end of each chapter are for those looking for a challenge … . The book gives adequate 'easy' exercises for those of normal ability range, although an introductory text may be helpful for some chapters, particularly the one of Centres of Mass. Certainly helpful for first year undergraduates studying classical mechanics.*

1st year A level Applied Maths book – full of examples although strong maths skills required to 'unpick' some examples

Positives: Full of examples, goes beyond current A-Level and goes up to some level 4 engineering maths

Negatives: Have to unpick problems. Quite old but still in print

---

Particle Mechanics (Modular Mathematics Series)

Collinson, C. D., Roper, T. London: A Butterworth-Heinemann
1995

Introduction:

From the publisher: *This text provides an invaluable introduction to mechanics confining attention to the motion of a particle. It begins with a full discussion of the foundations of the subject within the context of mathematical modelling before covering more advanced topics including the theory of planetary orbits and the use of rotating frames of reference. Truly introductory, the style adopted is perfect for those unfamiliar with the subject and, as emphasis is placed on understanding, readers who have already studied mechanics will also find a new insight into a fundamental topic.*

Positives: Good examples and explanations of classical kinematics.

Negatives:

Vector calculus (modular mathematics series)

Cox, W. United Kingdom: Butterworth-Heinemann.
1998

From the publisher: *Building on previous texts in the Modular Mathematics series, in particular 'Vectors in Two or Three Dimensions' and 'Calculus and ODE's' this book introduces the student to the concept of vector calculus. It provides an overview of some of the key techniques as well as examining functions of more than one variable, including partial differentiation and multiple integration. Undergraduates who already have a basic understanding of calculus and vectors, will find this text provides tools with which to progress onto further studies; scientists who need an overview of higher order differential equations will find it a useful introduction and basic reference.*

Positives:

Negatives: Muddled and uninspiring. Not about vector calculus as normally understood but calculus of functions of several variables.

Ordinary Differential Equations - (Modular Mathematics Series)

Cox, W., Cox, W. and Cox, B . London: Butterworth-Heinemann.
1995

From the publisher: *Building on introductory calculus courses, this text provides a sound foundation in the underlying principles of ordinary differential equations. Important concepts, including uniqueness and existence theorems, are worked through in detail and the student is encouraged to develop much of the routine material themselves, thus helping to ensure a solid understanding of the fundamentals required.*

The wide use of exercises, problems and self-assessment questions helps to promote a deeper understanding of the material and it is developed in such a way that it lays the groundwork for further study of partial differential equations.

Positives: Good examples and explanations
Negatives:

Foundation Maths.

Croft, A. and Davison, R. (2006) 4th edn. New York: Pearson/Prentice Hall.
2006

From the publisher: *"Foundation Maths" is designed to pave the way into higher education for those students who have not specialized in mathematics at 'A level'. It is intended for non-specialists who need some, but not a great deal of mathematics as they embark on careers in higher education. It takes students from around the lower levels of GCSE to a standard which will enable them to participate fully in a degree or diploma course. It is suitable for foundation and access courses in mathematics and for those who wish to enter a wide range of courses such as marketing, business studies, management, science, engineering, social science, geography, combined studies and design. The style of the book also makes it suitable for self-study or distance learning. Objectives are clearly stated at the beginning of each chapter, and key points and formulas are highlighted throughout the book. Self-assessment questions are provided at the end of most sections. These test understanding of important features in the section and answers are provided. These are followed by exercises for which answers are also available. A further set of test and assignment exercises is given in each chapter, but solutions are not provided to these.*

Positives: Well-judged content and pace. Lives up to these authors' excellent reputation for student-friendly material. Covers much of the material encountered in maths support centres

Negatives: Revised edition about to be published

Engineering mathematics: A foundation for electronic, electrical, communications, and systems systems

Croft, T., Croft, A., Davison, R. and Hargreaves, M. Harlow, England: Pearson/Prentice Hall.

2000 3rd

From the publisher: *Engineering Mathematics is the leading undergraduate textbook for Level 1 and 2 mathematics courses for electrical and electronic engineering, systems and communications engineering students. It includes a basic mathematics review, along with all the relevant maths topics required for these engineering degrees.*

For electrical engineering, Gentle explanations, Numerous examples and Exercises, Review exercises, Making abstract deductions, Brief review of basics, Covers usual engineering topics: Matrices, Laplace, Fourier and z transforms, ODE. Authors highly regarded.

Positives: Good focus on electrical engineering

Negatives:

Guide to Mechanics (Macmillan Mathematical Guides)

Dyke, P. and Whitworth, R. W. Basingstoke: Palgrave Macmillan.

2001 2nd

From the publisher: *A sound knowledge of Mechanics is fundamental to an understanding of much of physics and engineering. This book takes the reader through the fundamentals of the subject in as informal a manner as possible, without sacrificing mathematical rigour.*

The second edition has new material on orbits, rigid body mechanics and non-linear dynamics to produce a more comprehensive text that serves the needs of undergraduate students of mathematics, physics and engineering.

Positives: Good book with lots of examples which bridges gap between A level and first year applied/engineering maths

Negatives:

Advance Modern Engineering Mathematics

Glyn James

3rd

From the publisher: *Building on the foundations laid in the companion text Modern Engineering Mathematics, this book gives an extensive treatment of some of the advanced areas of mathematics that have applications in various fields of engineering, particularly as tools for computer-based system modelling, analysis and design.*

The philosophy of learning by doing helps students develop the ability to use mathematics with understanding to solve engineering problems. A wealth of engineering examples and the integration of MATLAB and MAPLE further support students.

Positives: Good thorough worked examples

Negatives: Needs mathematical maturity

A-Level mathematics: course companion

Graham, D., Graham, C. and Whitcombe, A., London: Letts Educational.

1984

Introduction: Great revision guide which covers the key areas of all the A Level examination boards. Good examples and worked examples.

Positives: Includes both pure and applied. Good reminders of techniques.

Negatives: Not too much teaching, a revision guide

Guide to analysis (Macmillan mathematical guides).

Hart, M. F. Basingstoke: Palgrave Macmillan.

Edited by David Towers 2nd edn. 2001

From the publisher: *[A]ims to guide undergraduate students through the first year of their mathematics course. It provides a rigorous introduction to Analysis, which takes into account the difficulties students often face when making the transition from A-level mathematics to this higher level. Plenty of examples are provided, some of which have full, detailed solutions, and others which encourage the student to discover and investigate the ideas themselves. Hints are provided, but the book aims to build confidence and understanding in all topics.*

Calculus from scratch emphasising rigour. School → university transition.

Positives: Painstaking. This is a gentle introduction to a "hard" topic

Negatives: Sometimes gets lost in a fog of detail. Just calculus, not analysis as usually thought of.

University Calculus, Early Transcendentals

Hass, J. R. Weir, M. D. and Thomas, G. B.

2nd 2013: 978-1292025018.

From the publisher: *This text helps students successfully generalize and apply the key ideas of calculus through clear and precise explanations, thoughtfully chosen examples, and superior exercise sets. This text offers the right mix of basic, conceptual, and challenging exercises, along with meaningful applications.*

Covers differential calculus and integral calculus in single and multiple variables. Provides lots of examples which thoroughly illustrated with the help of diagrams. Also contains exercise questions for readers to have a go at. Explains calculus for Maths and Physics students at second year standard. Highly relevant for Mathematics and Physics students.

Positives: Good layout. Worked examples. Diagram illustrations.

Negatives: Expensive. Answers are only provided for odd number exercises.

Edexcel AS and A Level Modular Mathematics Mechanics 1

Hooker, S. Jennings, M. and Pateman, L.

2015 1st

This book focuses on material for mechanics at 'A level' standard. Very relevant to foundation year students. Provides a lot of practice for mechanics problems in the form of step-by-step worked examples and exercises. Foundation Year and First Year UG students. Recapping Maths 'A Level' and a source of worked examples and illustrations. Suitable for Mechanics students and Mechanical engineers. Recommended for finding worked examples and for finding exercises to work through.

Positives: Excellent user friendly layout. Extremely relevant to a lot of the students that I have seen.

Negatives: It is not free but affordable

Complex variables and applications

James Ward Brown Ruel V. Churchill

McGraw-Hill Education, 2013},

ISBN 0073383171

From the publisher: *The text is designed to develop the theory that is prominent in applications of the subject. You will find a special emphasis given to the application of residues and conformal mappings. To accommodate the different calculus backgrounds of students, footnotes are given with references to other texts that contain proofs and discussions of the more delicate results in advanced calculus.*

Positives: Emphasis on applications so a lot on residues and conformed mappings

Negatives: Very expensive

Advanced modern engineering mathematics.

James, G., James, P. G., Burley, D., Dyke, P. P., Searl, J., Steele, N. and Wright, J. (1999) 2nd edn. Harlow, England: Addison-Wesley. 1999

From the publisher: *The philosophy of "learning by doing" is retained in this second edition with a continuing emphasis on the development of students' ability to use mathematics with understanding to solve engineering problems. Building on the foundations laid in "Modern Engineering Mathematics" this book gives an extensive*

treatment of some of the more advance fields of engineering, particularly as tools for computer-based system modelling, analysis and design.

Very thorough at this level, good examples of applications. Applying advanced mathematical methods in engineering. Range of topics

Positives: Very thorough, good applied examples, reasonably paced, detail not overwhelming

Negatives: Heavy! Slightly odd sequencing of topics

Fundamental of Mathematical Analysis

Lorch, E. R. and Haggarty, R. United States: Addison-Wesley Educational Publishers. 1993

Introduction:

From the publisher: *Providing students with a clear and understandable introduction to the fundamentals of analysis, this book continues to present the fundamental concepts of analysis in as painless a manner as possible. To achieve this aim, the second edition has made many improvements in exposition.*

This book has clear and simple explanations on what can be complicated concepts in analysis

Positives: Well received, clearly written, worked examples exercises and answers

Negatives: Expensive

Vector calculus

Matthews, P. C. New York: Springer-Verlag Berlin and Heidelberg GmbH & Co. K. 1998 1st

From the publisher: *Vector calculus is the foundation stone on which a vast amount of applied mathematics is based. Topics such as fluid dynamics, solid mechanics and electromagnetism depend heavily on the calculus of vector quantities in three dimensions. This book covers the material in a comprehensive but concise manner, combining mathematical rigour with physical insight. There are many diagrams to illustrate the physical meaning of the mathematical concepts, which is essential for a full understanding of the subject. Each chapter concludes with a summary of the most important points, and there are worked examples that cover all of the material. The final chapter introduces*

some of the most important applications of vector calculus, including mechanics and electromagnetism.

"Fundamental language of mathematical physics". Grounding in this topic for mathematical physics.

Positives: Crisp introduction. Just vector calculus so no wandering into other topics. This is a gentle introduction to a "hard" topic.

Negatives: Slightly eccentric choice and ordering of topics.

Schaum's outline of logic.

Nolt, J., Rohatyn, D. A. and Varzi, A. New York: McGraw-Hill Professional Publishing.
2011 2nd

From the publisher: 5*00 solved problems. Includes non-classical logics, covers the probability calculus, complements or supplements the major Logic textbooks. Appropriate for the following courses: Introduction to Formal Logic, Informal Logic, Logic Programming, and Algebra. Complete course content in easy-to-follow outline form, Hundreds of solved problems*

Good book for pure mathematicians. Lots of explanations and examples. I've used it personally and to teach students.

Positives: Usual Schaum standard of presentation

Negatives: Quite a lot of the early chapters not relevant to mathematical approach to logic.

Sets, Logic and Maths for Computing

Makinson, D. Springer London Ltd.
2012 2nd: ISBM 9781447124993

From the publisher: *This easy-to-follow book introduces the mathematical language, knowledge and problem-solving skills needed for the study of computing. The language is both qualitative and quantitative, and includes basic notions of logic used for representation and proof. Collecting Things Together: Sets Comparing Things: Relations Associating One Item with Another: Functions Recycling Outputs as Inputs: Induction and Recursion Counting Things: Combinatorics Weighing the Odds: Probability Squirrel Math: Trees Yea and Nay: Propositional Logic Something about Everything: Quantificational Logic Just Supposing: Proof and Consequence*

From the reviews of the second edition: "This book is an excellent introductory course on mathematical language, knowledge and problem solving skills for undergraduate students who need to enter the world of computer and information sciences. ... This easy-to-follow text allows readers to carry out their computing studies with a clear understanding of the basic finite mathematics and mathematical logics that they will need. ... is ideal for self-study as well as classroom use. ... the book will be of interest to any student who would like to understand the mathematical language." (Valentina Dagiene, Zentralblatt MATH, Vol. 1239, 2012)

The Chemistry Maths Book

Steiner, E. (2008) . New York: Oxford University Press, USA.

2008 2nd

From the publisher: *The Chemistry Maths Book provides a complete course companion suitable for students at all levels. All the most useful and important topics are covered, with numerous examples of applications in chemistry and the physical sciences. Taking a clear, straightforward approach, the book develops ideas in a logical, coherent way, allowing students progressively to build a thorough working understanding of the subject. Topics are organized into three parts: algebra, calculus, differential equations, and expansions in series; vectors, determinants and matrices; and numerical analysis and statistics. The extensive use of examples illustrates every important concept and method in the text, and are used to demonstrate applications of the mathematics in chemistry and several basic concepts in physics. The exercises at the end of each chapter, are an essential element of the development of the subject, and have been designed to give students a working understanding of the material in the text.*

Focus on examples from chemistry. Attempts to cover all maths for chemistry. Wide range of topics. Lots on integral and related transforms. Vector calculus, calculus of several variables

Positives: Good realistic examples from chemistry

Negatives: Feels very rushed moving very quickly from simple examples and applications at much move complex (and realistic) ones

---

Advance Engineering Mathematics

Stroud, K. A. and Booth, D. J. Basingstoke: Palgrave Macmillan.
2011 5th 978-0230275485

From the publisher: *A unique technique-oriented approach takes the student through the mathematics in a highly accessible way. Comprehensive coverage of all topics required by undergraduates at advanced levels of mathematics in engineering and science. Hundreds of worked examples and progressively more challenging exercises. Ideal either as part of a course or for self-study.*

This book is good for year 2 Engineering department. Continues from the Engineering Maths with more as the book says advanced topics.

Positives: Clear step by step approach
Negatives: Heavy!

Engineering mathematics.

Stroud, K. A. and Booth, D. J. Basingstoke: Palgrave Macmillan.
2013 7th

From the publisher: *A unique technique-oriented approach takes the student through the mathematics in a highly accessible way. Comprehensive coverage of all topics required by undergraduates at advanced levels of mathematics in engineering and science. Hundreds of worked examples and progressively more challenging exercises. Ideal either as part of a course or for self-study.*

Comprehensive coverage: BODMAS to Laplace Transforms. Worked examples, programmed progression of topics, Lots of examples on techniques but not so many on applications. Some examples have heavy arithmetic. Some statistics and probability but feels like an afterthought.

Positives: Clear step by step approach, quizzes at the beginning of each chapter to guide students at what they need to review or study.
Negatives: Heavy!

Schaum's Outline of Advanced Calculus

Introduction:

From the publisher: *1,370 fully solved problems, Complete review of all course, fundamentals, Clear, concise explanations of all Advanced Calculus concepts*

Topics include: Numbers; Sequences; Functions, Limits, and Continuity; Derivatives; Integrals; Partial Derivatives; Vectors; Applications of Partial Derivatives; Multiple Integrals; Line Integrals, Surface Integrals, and Integral Theorems; Infinite Series; Improper Integrals; Fourier Series; Fourier Integrals; Gamma and Beta Functions; and Functions of a Complex Variable

A big book full of problems. It covers most of the stuff that engineering students cover, i.e. vector calculus, Fourier series and complex analysis…. Covers calculus beyond the basic differentiation and integration. Contains vector calculus, Fourier series, complex analysis, partial differentiation and line/2/3D integration.

Positives: Usual Schaum standard of presentation

Negatives: One Amazon review says "Lots of typos".

Resources - Online

patrickJMT = Youtube Videos

https://www.youtube.com/channel/UCFe6jenM1Bc54qtBsIJGRZQ

Cover a wide range of maths, statistics and chess! These free youtube video are short and to the point and they are produced by someone who is passionate about maths his excitement and enthusiasm for the subject comes through. Maths for STEM disciplines at university level. Good place to point students to who know the area and topics they need to brush up on. Worth supplementing with other material with examples to work through. 'I like maths and I like sharing my understanding of it. Trying to empower people with a bit of math know-how! It IS a challenging subject but it is just so, so beautiful and amazing as well! No songs, no dances, no silly hats, no low cut shirts and sultry voices. I make straight, to the point videos on how to tackle different math problems.'

Positives: Free and produced by a passionate instructor.

Negatives: Does not have lots of examples to practice on

Mathcentre: Staff and Student resources

http://www.mathcentre.ac.uk/

mathcentre was developed by a group from the Universities of Loughborough, Leeds and Coventry, the Maths Stats and OR Network and the Educational Broadcasting Services Trust in 2003. Important components of the site were developed through the sister project mathtutor which was funded by the HEFCE and the Gatsby Charitable Foundation. mathcentre was upgraded in 2010 with funding from JISC. As part of this upgrade, mathcentre resources are being deposited in the JorumOpen and FETLAR repositories.

mathcentre has been set up to deliver mathematics support materials, free of charge, to students, lecturers and everyone looking for post-16 maths help. The mathcentre team are a group of people who run university mathematics support centres, who teach mathematics, and who design new media products for learning.

mathcentre gives you the opportunity to study important areas of pre-university mathematics, which you may have studied before or may be new to you - the maths you know you will need for your course.

There are a variety of resources - self study guides; test yourself diagnostics and exercises; video tutorials; iPod and 3G mobile phone downloads; and case studies. Resources are available on-line, and may be printed or downloaded.

HELM: Helping Engineers Learn Maths

http://www.lboro.ac.uk/departments/mec/activities/helm/

HELM - Helping Engineers Learn Mathematics - was a major curriculum development project undertaken by a consortium of five English universities - Loughborough, Hull, Reading, Sunderland and Manchester - led by Loughborough, and funded by the Higher Education Funding Council for England (HEFCE) for the period October 2002 - September 2006.

We offer HE institutions the opportunity to use HELM resources. You can use them to support the teaching of a complete mathematics module, or part of it, to engineering students. Alternatively your students can use the resources for independent learning.

Registered HELM users can:

- Use the high quality printed HELM workbooks.
- Use the associated HELM CAL segments.
- Use the HELM assessment regime.

Khan Academy

https://www.khanacademy.org/

Khan Academy offers practice exercises, instructional videos, and a personalized learning dashboard that empower learners to study at their own pace in and outside of the classroom. We tackle math, science, computer programming, history, art history, economics, and more. Our math missions guide learners from kindergarten to calculus using state-of-the-art, adaptive technology that identifies strengths and learning gaps. We've also partnered with institutions like NASA, The Museum of Modern Art, The California Academy of Sciences, and MIT to offer specialized content.

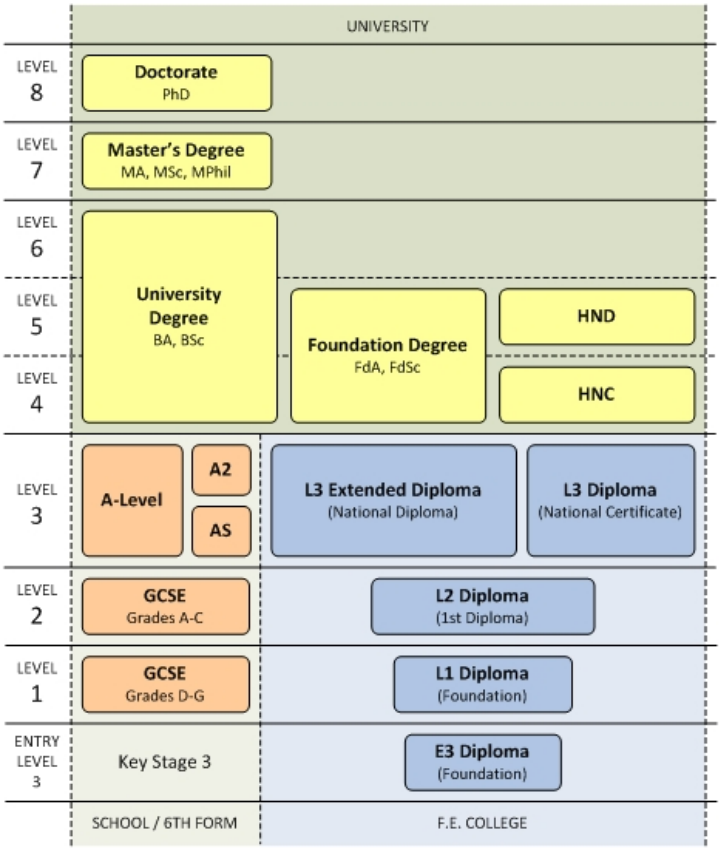
Word of warning there's a lot of material there to get lost in be selective!

Index for pull out poster grid

Attributes

Levels	
Applied/ Theoretical/ Vocational	Vocational: Suitable for non-traditional entrants Theoretical: Suitable for students with theoretical background Applied: Maths Applied to discipline applications
Full Explanations	Contains full explanations, easy to follow
Worked Examples	Step by step examples in full
Practice Exercises	Plenty of exercises to work on
Practical Examples	Contains practical examples of the topics, giving context to maths
Tests	Allowing for self-assessment
Proof/Theory	Details of proofs and theorems
Rating	1 Extremely poor …. 10 Excellent

Levels



Taxonomy

1.0 Numbers and Computation

- 1.1 Number Concepts
- 1.2 Arithmetic
- 1.3 Patterns and Sequences
- 1.4 Measurement

2.0 Logic and Foundations

- 2.1 Logic
- 2.2 Set Theory
- 2.3 Computability and Decidability
- 2.4 Model Theory

3.0 Algebra and Number Theory

- 3.1 Algebra
- 3.2 Linear Algebra
- 3.3 Abstract Algebra
- 3.4 Number Theory
- 3.5 Category Theory
- 3.6 K-Theory
- 3.7 Homological Algebra
- 3.8 Modular Arithmetic

4.0 Discrete Mathematics

- 4.1 Cellular Automata
- 4.2 Combinatorics
- 4.3 Game Theory
- 4.4 Algorithms
- 4.5 Recursion
- 4.6 Graph Theory
- 4.7 Linear Programming
- 4.8 Order and Lattices
- 4.9 Theory of Computation
- 4.10 Chaos

5.0 Geometry and Topology

- 5.1 Geometric Proof
- 5.2 Plane Geometry
- 5.3 Solid Geometry
- 5.4 Analytic Geometry
- 5.5 Projective Geometry
- 5.6 Differential Geometry
- 5.7 Algebraic Geometry
- 5.8 Topology
- 5.9 Trigonometry
- 5.10 Fractal Geometry

6.0 Calculus

- 6.1 Single Variable
- 6.2 Several Variables
- 6.3 Advanced Calculus
- 6.4 Tensor Calculus
- 6.5 Calculus of Variations
- 6.6 Operational Calculus

7.0 Analysis

- 7.1 Real Analysis
- 7.2 Complex Analysis
- 7.3 Numerical Analysis
- 7.4 Integral Transforms
- 7.5 Signal Analysis
- 7.6 Functional Analysis
- 7.7 Harmonic Analysis
- 7.8 Global Analysis

8.0 Differential and Difference Equations

- 8.1 Ordinary Differential Equations
- 8.2 Partial Differential Equations
- 8.3 Difference Equations
- 8.4 Dynamical Systems