Mathematics Bridging for Advanced Engineering Studies

Why is a Mathematics Bridging Course required?

The Advanced Diploma of Engineering Practice ("DEN") is designed to articulate into years 3 and 4 of Engineering studies at University. It therefore follows that the level of Maths incorporated into the DEN is of the same standard as the Maths you would encounter in your first two years at University. Without very strong Maths students would be likely to struggle and possibly fail the Maths units in the program.

Who needs to do the Mathematics Bridging Course?

The purpose of this 6 month non-award program is to bring students up to the standard that is required to be able to tackle the maths units in the advanced diploma program. As most students know, including those who may have studied maths at an advanced level in the past, it is not unusual to find this level of maths challenging unless your studies are relatively recent. If you studied (and passed) Maths within the last 5 years at a level that would have prepared you for subsequent Engineering studies at University (generally the highest level of maths you could study in your final year of secondary school or college) you would be prepared for the DEN Maths units. If you completed a Bachelor’s degree in a ‘science’ subject, your Maths knowledge would also be deemed sufficient. All other applicants would be required to do the Maths Bridging Course.

Frequently Asked Questions

Q: When does the next Bridging Program start?
   A: The next program starts in the week of 5th August 2013

Q: How much does it cost?
   A: The cost is A$1190. This includes 12 months access to MyMathLab
   (http://www.mymathlab.com/learn-about )

Q: If I complete this bridging course successfully will I be eligible to apply for entry into an engineering degree program at any university?
   A: No, this program is specifically designed as a maths bridging program into the Advanced Diploma of Engineering Practice, which then leads into the university programs outlined in the program brochure for that qualification.

Q: If I complete this bridging course successfully will I be eligible to enter the Advanced Diploma of Engineering Practice?
   A: No. This is not automatic. Students who wish to enter the Advanced Diploma of Engineering Practice should submit an application for that program before registering for this
bridging course. If the Academic Panel accepts enrolment for the Advanced Diploma it may be provisional (that is, subject to successful completion of “Mathematics Bridging for Advanced Engineering Studies”). Students may then register for this course. Please also see next question.

Q: What are the entrance requirements?
   A: Students will need to have received provisional acceptance into the Advanced Diploma of Engineering Practice (see previous question). In order to be successful in this course students will need to have a reasonable level of maths. The definition of “reasonable” vary. Some students may be able to demonstrate past success at junior high school maths, others may have completed maths a senior high school or college but not at the required level, others may have completed advanced maths but some time ago. Your registration form will provide the EIT with some indication of your maths background, and ultimately your determination to be successful is a prime determinant of your chances of success.

Q: Are there any textbooks involved?
   A: No

Q: How long is the course?
   A: 24 weeks

Q: What does the course cover?
   A: Details of the course contents are covered in the next section of this brochure.

Q: How much of my time will it take up?
   A: You will be required to invest approximately 12 hours per week

Q: How will I know what is being covered and when?
   A: You will receive a detailed study guide at the commencement of the course

Q: What is the structure of the course presentation?
   A: There will be one lecture/tutorial session per week.
   • Classes will be conducted online via “Blackboard Collaborate” web conferencing software (https://www.blackboard.com/platforms/collaborate/overview.aspx)
   • You will use MyMathLab for study purposes, and to do your assignments
   • Feedback/communication with your lecturer will be via email, Skype and the “Moodle” Learning Management System (which is like a Course Website)
   • There will be a homework assignment for every lecture
   • An addition, there will be 4 tests over the 24 weeks

Live Webinars
During the program you will participate in live interactive sessions with the instructor and other participants from around the world. Each webinar will last approximately 60 to 90 minutes, and we take student availability into consideration wherever possible before scheduling webinar times. Contact us for details of webinar session scheduling. All you need to participate is an adequate Internet connection, speakers and a microphone. The software package and setup details will be sent to you prior to the course.
Benefits of e-learning

- Attend lessons in an online classroom with your instructor and fellow students
- Upgrade your skills and refresh your knowledge without having to take valuable time away from work
- Receive information and materials in small, easy to digest sections
- Learn while you travel - all you need is an Internet connection
- Have constant support from your course instructor and coordinator for the duration of the course
- Live interactive webinars, not just a ‘book on the web’

About the EIT

The Engineering Institute of Technology is a private registered training organization. EIT is a sister company of the well known and reputable engineering training organization, IDC Technologies. IDC has been operating for over 20 years, from offices throughout the world, delivering practical short programs to well over 300,000 engineers and technicians. The finest engineering lecturers, with extensive real engineering experience in industry, are drawn from around the world. The learning is delivered to students through a blend of synchronous and asynchronous, online (e-learning) technologies, which includes live lectures and remote laboratories. The EIT offers education awards in a growing array of engineering fields.

Many (perhaps, most) engineering faculties at universities and colleges experience a significant challenge delivering the program-work affordably and with excellence. The EIT achieves this using online based education - economical class sizes are attainable, international experts are engaged to instruct and remote laboratories and simulation software are employed. Many institutions offer online training, with no interaction or practical components and composed mainly of self study and perhaps supplied recordings. This format offers very little in the way of motivation or practical skills and can leave students feeling isolated. The live, interactive format of the EIT’s online programs allow expert lecturers to present from anywhere in the world, to anyone in the world, and students can interact and socialise with lecturers and fellow students. Students not only have access to international expert lecturers, but are provided with a worldwide network of peers. The EIT’s online learning provides cost-effective, flexible training with no compromise on quality.

Hardware and software requirements

All you need in order to join the webinars once registered for the course is an adequate internet connection, PC, speakers and a microphone. The software package and setup details will be sent to you prior to the course.
Program Outline

Topics

- Systems of Linear Equations
- Inequalities and Absolute Values
- Quadratic Equations
- Logarithms
- Introduction to Functions
- Introductory Geometry
- Introductory Trigonometry
- Sequences and Series
- Variation, Ratio and Proportion
- Introduction to Probability
- Statistics and Standard Deviation
- Additional Topics in Algebra
- Trigonometric Functions and Ratios
- Graphs of trigonometric Functions
- Analytical Geometry
- Vectors
- Introductory Differentiation
- Introductory Integration
- Applications of the Derivative
- Applications of Integration

Week 1: Systems of Linear Equations

- Solving Linear Equations
- Checking Solutions
- Substitution Method
- Elimination Method
- Graphical Method
- Dependent and Inconsistent Solutions

Week 2: Inequalities and Absolute Values

- Definitions
- Rules for Solving Inequalities
- Compound Inequalities
- Graphing Linear Inequalities
- Systems of Linear inequalities
- Absolute Values
- Solving Absolute Value Equations
- Graphing Absolute Values
- Absolute Value Inequalities

Week 3: Quadratic Equations

- Expanding Quadratics
- Special Cases
- Factorising Quadratics
- Simplifying Rational Expressions
- Quadratics and Equation Solving
- The Quadratic Formula
- Completing the Square
- Sketching Quadratics
- Quadratic Applications

Week 4: Logarithms

- Exponent Rules
- Combination Exercises
- Simplification Using Prime Factors
- Definitions of Logarithms
- Special Bases
- Identities and Properties of Logarithms
- Logarithmic Equations
- Application of Logarithms
Week 5: Introduction to Functions
- Definitions and Notation
- Evaluating Functions
- Algebra of Functions
- Determining Domain and Range
- Common Functions and their Graphs
- Graphing Functions
- Transforming Function Graphs
- Inverses of Functions

Week 6: REVISION AND TEST

Week 7: Introductory Geometry
- Points, Lines and Angles
- Plain Shapes
- Perimeter
- Area
- Volume

Week 8: Introductory Trigonometry
- Triangle Definitions and Labelling
- Pythagoras’ Theorem
- Angles of Elevation and Depression
- The Trigonometric Ratios
- Sine
- Cosine
- Tangent
- Mixed Trigonometric Ratios

Week 9: Sequences and Series
- Definitions and Notations
- Arithmetic Sequences and Series
- Applications of Arithmetic Sequences
- Geometric Sequences and Series
- Applications of Geometric Sequences
- Recursion Formula and the Fibonacci Sequence
- Mathematical Induction
- Pascal’s Triangle and the Binomial Theorem

Week 10: Variation, Ratio and Proportion
- Ratios
- Rates
- Scale Diagrams
- Direct Variation
- Inverse Variation
- Joint and Combined Variation

Week 11: Introduction to Probability
- Terminology and Definitions
- Probability Scale
- Theoretical Probability
- Probability Rules
- Permutations and Combinations

Week 12: Statistics and Standard Deviation
- Mean
- Variance
- Standard Deviation
- Coefficient of Variation
- Normal Distribution and Z-Scores
- Chebyshev’s Theorem
- Correlation and Scatterplots
- Correlation Coefficient and Regression Equation

Week 13 REVISION, TEST

Week 14: Additional Topics in Algebra
- Algebraic Properties
- Working with Surds
- Expanding Binomials
- Factorising Binomials
- Algebraic Fractions
- Solving Equations and Inequalities
- Systems of equations and Inequalities
Week 15: Trigonometric Functions and Ratios
- Definitions of Trigonometric Ratios
- Using Trigonometric Ratios
- The Unit Circle and Radian Measure
- Applications of Radian Measure
- Symmetry and the Unit Circle
- Trigonometric Identities and Expression Simplification
- Solving Trigonometric Equations
- Applications of trigonometric equations

Week 16: Graphs of trigonometric Functions
- The Sine Graph
- The Cosine Graph
- Changing Amplitude
- Changing Frequency
- Phase Shift
- Vertical Shift
- Combination Changes
- Equations from Graphs
- Applications

Week 17: Analytical Geometry
- Angles and Lines
- Triangles
- Quadrilaterals
- Polygons
- Circle Properties
- Irregular Areas
- Solid Figures
- Straight Lines and Equations
- Circle Equations
- Parabolas, Ellipses and Hyperbolas

Week 18: Vectors
- Notation and Definitions
- Vector Components
- Operations with Vectors
- Vector Applications
- Laws of Sines and Cosines

Week 19: REVISION, TEST

Week 20: Introductory Differentiation
- Limits and Continuity
- Gradient of a Tangent to a Curve
- Defining Differentiation
- Derivatives by Definition
- Derivatives of Powers of x
- The Product Rule
- The Chain Rule
- The Quotient Rule
- Derivatives of Other Functions
- Higher Derivatives and Graphs of Derivatives

Week 21: Introductory Integration
- Integration Notation and techniques
- The Indefinite Integral
- Integration of Other Functions
- Integration of Composite Functions- Substitution Method
- Reimann Sums and the Fundamental Theorem of Calculus
- Definite Integrals, Areas and Curves
- Numerical Integration

Week 22: Applications of the Derivative
- Derivative Rules and Techniques
- Sketching curves
- Equations of Tangents and Normals to Curves
- Optimisation-Maximum and Minimum Problems
- Relate Rates
- Physical Science and Engineering Applications
- Financial Applications
- Newton’s Method of Solving Equations

Week 23: Applications of Integration
- Integration Rules and Techniques
- Areas and Curves
- Solids of Revolution
- Anti-Differentiation and Rates of Change
- Engineering and Scientific Applications
- Financial Applications

Week 24: REVISION, TEST

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