BSc (Hons)

Engineering

Top-Up

2017/18

# WELCOME TO BSc ENGINEERING TOP-UP

On behalf of the Engineering Team at The University of Northampton, welcome to your Engineering programme. We all hope that you’ll enjoy your studies and that you’ll get a lot of benefit from the new knowledge you will acquire.

We’ve been tutoring programmes in Engineering for many years, and most of us have worked at one time or another in the engineering industry, so we’re confident that we can provide you with all the support you need. More than that, we’re looking forward to working with you and learning with you as well about how industry is working today - what’s new, what’s improving and what’s changing.

During Welcome Week in September (week beginning 25 September 2017), you will meet the course team and attend a few talks to help you to settle in to your exciting new environment. To facilitate this process and to create opportunities for you to get to know your peers, you are required to do some preparatory work over the summer, the details of which you will find below. In this pack you will also find other relevant information about the course prior to meeting you during Welcome Week.

**INDICATIVE TIMETABLE**

During the academic year it is hoped that you will successfully complete all four 20 credit modules plus the 40 credit engineering project. In order to achieve this you will be expected to attend University on Wenesday each week and undertake significant independent learning.

**COURSE STRUCTURE / AWARD MAP**

In order to achieve the named award BSc Engineering Top-Up, Students must meet all the requirements of this map.

**STAGE 3**

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Code | Title | Status | Credits | Pre-Requisites |
| ENG3002 | Computer Simulation and Modelling | Compulsory | 20 | None |
| ENG3005 | Lean Manufacturing & Quality Applications | Compulsory | 20 | None |
| ENG3020 (2nd term) | Advanced Electro-Mechanical System Design | Compulsory | 20 | None |
| ENG3021 | Machines and Mechanisms | Compulsory | 20 | None |
| ENG4004 | Engineering Project | Compulsory | 40 | None |

# TEACHING INFORMATION

Blended Delivery - Each module is made up of appropriate blended learning components, this is a mix of methods, including both face-to-face activities and online learning e-activities, which can be completed on or offsite and you will be given advice on when they are best to complete. Each module has a Coordinator and they meet on a regular basis with the Programme Leader to ensure that the highest quality teaching and learning activities are being provided.

Seminars and Seminar presentations — to allow students to test ideas against those of staff and other students as well as more formal presentations and to discuss contemporary and historical photography.

Practical demonstrations and Workshops — Workshop practices are a significant part of all the production modules. In addition to the transferring of technical skills and expertise, they offer hands-on instruction to students and guidance to complete specific technical or production tasks.

Projects — The project is essential in teaching and learning in that it encourages the definition of problems and their appropriate solution and evaluation. All projects have clearly defined learning outcomes and assessment criteria, related to content, which provide the framework for exploration, experiment, research, development, presentation and communication. As students progress through the course, they are expected to take a more active role in directing their own work and ideas, and designing their own project briefs through negotiation with staff.

Tutorials — Each student will be allocated a tutor. The tutorial system enables exploration through discussion of issues such as current work, progress, including new ideas and possibilities, providing analysis and exchange, through increasingly negotiated development to support progressively independent and student-centered learning. An open and direct approach to discussion of work is encouraged.

**4**

Industrial Visits and Activities — These aim to foster group dynamics, peer group learning and broadening of student experience of the industrial world.

Visiting speakers — carefully selected speakers with relevance to the course contribute through presentations on their practice and specialism, key events include Autumn and Spring seminars.

**INDUSTRIAL ENGAGEMENT**

A key part of the course is ensuring that students have an appreciation and as far as possible prepared for employment. Our industrial partners through the Northampton Engineering Training Partnership (NETP) support the Course. The NETP provides optional placements industrial engagement opportunities and other information sharing and engagement opportunities such as the Autumn and Spring Seminars and Annual Awards evening. Please check out the NETP activities via the following link: <http://www.netpengineering.co.uk/>

**READING LIST**

# *Engineering Mathematics: A Foundation for Electronic, Electrical, Communications and Systems Engineers* by [Dr Anthony Croft](https://www.amazon.co.uk/s/ref=dp_byline_sr_book_1?ie=UTF8&text=Dr+Anthony+Croft&search-alias=books-uk&field-author=Dr+Anthony+Croft&sort=relevancerank) (Author), [Robert Davison](https://www.amazon.co.uk/s/ref=dp_byline_sr_book_2?ie=UTF8&text=Robert+Davison&search-alias=books-uk&field-author=Robert+Davison&sort=relevancerank) (Author), [Martin Hargreaves](https://www.amazon.co.uk/Martin-Hargreaves/e/B0034PESGA/ref=dp_byline_cont_book_3)  (Author), [James Flint](https://www.amazon.co.uk/James-Flint/e/B001HP54M6/ref=dp_byline_cont_book_4)

# Publisher: Pearson; 4 edition (2 Aug. 2012)

ISBN-10: 0273719777, ISBN-13: 978-0273719779

***Physics for Scientists & Engineers with Modern Physics: Pearson New International Edition, 4/E***

By Doug Giancoli

# Publisher: Pearson; 4 edition (29 Jul. 2013)

ISBN-10: 1292020768 • ISBN-13: 9781292020761

# Prior Knowledge

The following is indicative understanding prior undertaking this course:

In terms of maths:

* Fundamental Algebra: one variable linear equations, one variable linear inequalities, two-variable linear equations, functions, linear equations and functions word problems, sequences, systems of linear equations, two-variable linear inequalities, absolute value and piecewise functions., expressions with rational exponents and radicals, introduction to exponential functions, polynomials, polynomial factorization, quadratic equations, rational and irrational numbers
* Matrix manipulation. Representing linear systems of equations with augmented matrices. Adding and subtracting, multiplying matrices, Matrix inverse, solving equations with inverse matrices.
* Basic Trigonometry. The unit circle definition of basic trigonometric functions. Graphs of trigonometric function.
* Trigonometry with general triangles
* Trigonometric equations and identities
* Integration and differentiation. Integration by parts, u-substitution, integration using trigonometric identities. Basic differentiation rules, power rule, differentiating linear functions, polynomial function differentiation, radical functions differentiation, exponential and natural logarithms differentiation.

In terms of electrical and electronic concepts:

* Kirchhoff's Laws, Circuit Analysis - Nodal and Mesh
* Linearity and Superposition, Source Transformations, Thévenin and Norton Equivalents
* RC,RL, RLC circuits.
* Frequency response.
* Semiconductors, diodes and bipolar transistors.
* OPAMPS.
* Boolean algebra rules, logic gates and logic simplification using Karnaugh Map.
* Basic Arduino Programming.

**PREPARATION PRIOR TO STARTING THE COURSE**

The following Khan Academy links cover the Engineering Math requirements.

* <https://www.khanacademy.org/math/trigonometry>
* <https://www.khanacademy.org/math/algebra>
* <https://www.khanacademy.org/math/precalculus/precalc-matrices>
* <https://www.khanacademy.org/math/algebra-home/alg-matrices>
* <https://www.khanacademy.org/math/integral-calculus/definite-integral-evaluation-ic>
* <https://www.khanacademy.org/math/integral-calculus/integration-techniques>
* <https://www.khanacademy.org/math/differential-calculus/basic-differentiation-dc>

The following Khan Academy links cover the Engineering Physics requirements.

* <https://www.khanacademy.org/science/physics>
* <https://www.khanacademy.org/science/physics/one-dimensional-motion>
* <https://www.khanacademy.org/science/physics/two-dimensional-motion>
* <https://www.khanacademy.org/science/physics/forces-newtons-laws>
* <https://www.khanacademy.org/science/physics/centripetal-force-and-gravitation>
* <https://www.khanacademy.org/science/physics/work-and-energy>
* <https://www.khanacademy.org/science/physics/linear-momentum>
* <https://www.khanacademy.org/science/physics/torque-angular-momentum>
* <https://www.khanacademy.org/science/physics/mechanical-waves-and-sound>
* <https://www.khanacademy.org/science/physics/fluids>

The following links are useful to get used to Arduino and electronics.

* Intro to Arduino (easy to follow). It helps grasping the basic syntax of Arduino programming.

<http://www.ladyada.net/learn/arduino/>

* Circuit Analysis Sample Video Lessons

<http://www.mathtutordvd.com/public/department225.cfm>

<http://www.mathtutordvd.com/public/Kirchhoffs_Laws_in_Circuit_Analysis.cfm>

* Intro to Electronics

<http://www.electronics-tutorials.ws/>