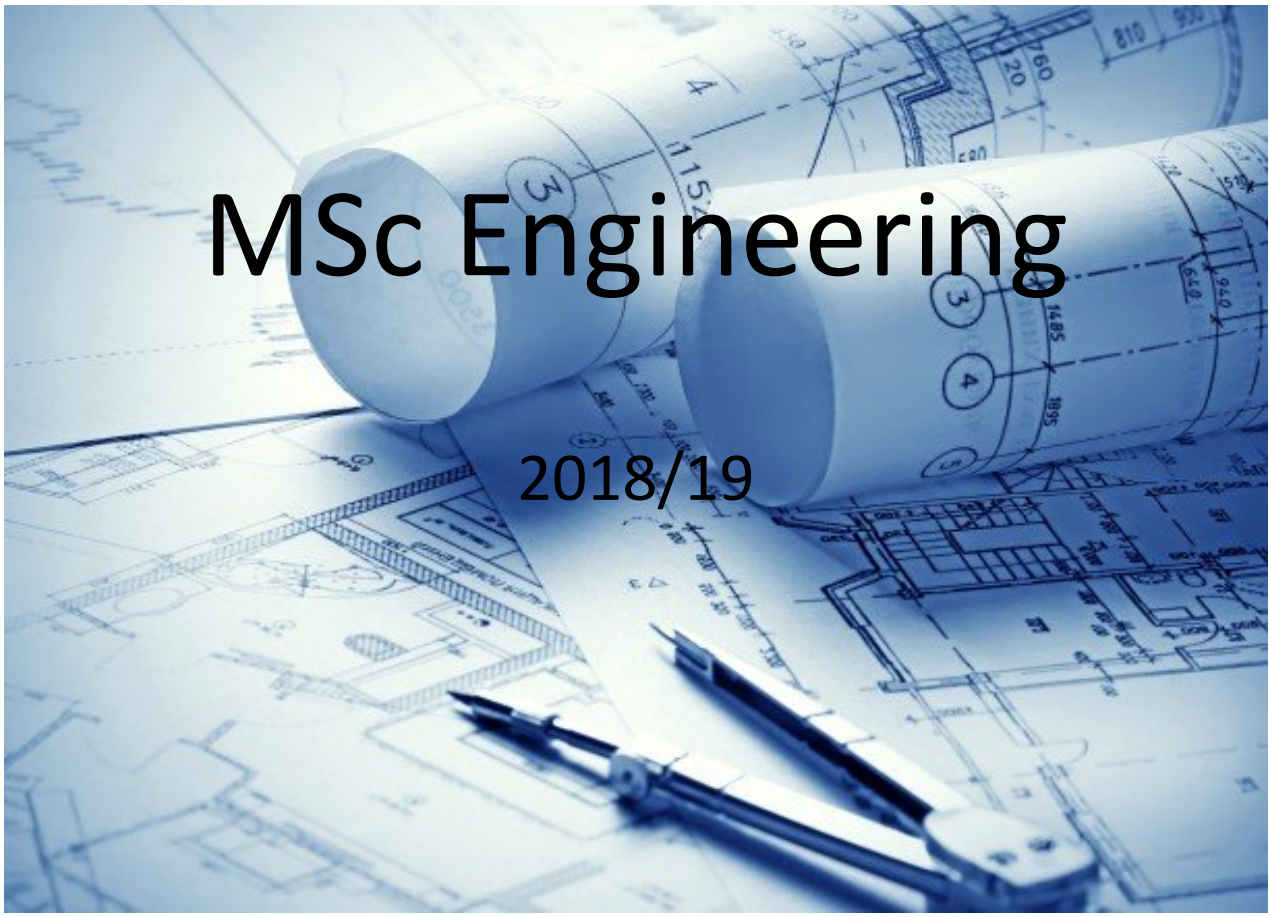
MSc Engineering



2018/19

WELCOME TO MSc ENGINEERING

On behalf of the Engineering Team at The University of Northampton, welcome to your MSc 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 24 September 2018), 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

The programme offers students a 1-year full-time or typically 2-year part-time programme at Master's level. It is modular and is based around a series of taught modules culminating in a significant research project. As for other university masters programmes it is delivered as a three-semester model, with each semester having 14 weeks. Semester 1 starts in October, Semester 2 in February and Semester 3 in June. In a one-year full-time course, students will study 3 modules in two of the semesters and the dissertation in the other semester over the summer (a total of 7 modules).

COURSE STRUCTURE / AWARD MAP

In order to achieve the award, students need to pass all the following modules:

Code	***Title***	***Credits***	***Status***	***Pre-Requisites***
ENGM001	Mathematical Modelling	20	Compulsory	None
ENGM002	System Dynamics and Vibrations	20	Compulsory	None

ENGM004	Computer Aided Analysis and Visualisation of Mechanical Systems	20	Compulsory	None
ENGM005	Individual Engineering Project	60	Compulsory	None
ENGM007	Advanced Control Technology	20	Compulsory	None
ENGM008	Condition Monitoring	20	Compulsory	None
ENGM009	Professional Practice for Technologists	20	Compulsory	None

TEACHING INFORMATION

Teaching / learning methods used on your course include:

Blended Delivery: Each module is made up of blended learning components that includes face-to-face activities and online learning 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.

SeminarsandSeminarpresentations:to allow students to test ideas against those of staff and other students as well as more formal presentations and to discuss course knowledge in the relevant modules.

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. Staff closely monitor the implementation, management and intellectual development of all projects.

Tutorials: The tutorial 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-centred learning. An open and direct approach to discussion of work is encouraged.

EQUIPMENT REQUIREMENTS

During the course you'll be using a wider range of specialist equipment and software to support practical elements of your course. This is provided and supported as part of your fees. The only element of equipment you will have to purchase is a scientific calculator. This can be purchased during the course following advice from the relevant module leader.

READING LIST

Most of your core reading will be available from the University's Library. This means that all your course reading materials are available for free when you start with us. You will not have to buy any core text books, and with access to countless books, e-books and journals there is enough to keep you busy for your entire degree.

The following lists some indicative reference books related to each module:

Mathematical Modelling (ENGM001)

1. S. Graham Kelly, Advanced Engineering Mathematics with Modeling Applications, CRC Press, 2008
2. Heinz, S., Mathematical Modeling, Springer-Verlag, 2011
3. J. Caldwell/Y.M. Ram, Mathematical Modelling: Concepts and Case Studies (Mathematical Modelling: Theory and Applications), Springer, 1999.
4. Kai Velten, Mathematical Modeling and Simulation: Introduction for Scientists and Engineers, 2008
5. Harold Klee, Randal Allen, Simulation of Dynamic Systems with MATLAB and Simulink, 2nd Edition, CRC Press, 2011
6. Charles M. Close, Dean K. Frederick, Jonathan C. Newell, Modeling and Analysis of Dynamic Systems, Wiley, 2001

System Dynamics and Vibrations (ENGM002)

1. Meirovitch, L., Methods of Analytical Dynamics, Dover, 2003
2. Shabana, A. A., Computational Dynamics, John Wiley & Sons, 2001
3. Rao, S. S., Mechanical Vibrations SI 5th (fifth) Edition, Pearson Ed Asia, 2011
4. Meirovitch, L., Principles and Techniques of Vibrations, Prentice-Hall, 1997
5. Nayfeh, A. H., Mook, D. T., Nonlinear Oscillations, John Wiley & Sons, 1979
6. MATLAB and Simulink Student Suite, MathWorks, 2015
7. COMSOL Multiphysics Release 5.1, COMSOL Ltd. 2015

Computer-Aided Analysis and Visualization of Mechanical Systems (ENGM004)

1. Shabana, A. A., Dynamics of Multibody Systems, Cambridge University Press, 2013
2. Nikravesh, P. E., Computer-Aided Analysis of Mechanical Systems, Prentice-Hall, 1988
3. Nikravesh, P. E., Planar Multibody Dynamics: Formulation, Programming and Applications, CRC Press, 2008

4. MATLAB and Simulink Student Suite, Mathworks, 2015
5. MATLAB/ SimMechanicsTM, Mathworks, 2015
6. Adams Student Edition, MSC Software, 2015
7. http://www.mscsoftware.com/page/adams-student-edition

Individual Engineering Project (ENGM005)

1. McMillan, Kathleen; Weyers, Jonathan , How to complete a successful research project, Pearson, 2014
2. Smith, Terry, Making successful presentations: a self-teaching guide, Wiley, 1991
3. Forsyth, Patrick, How to write reports and proposals, Kogan, 2010
4. McMillan, Kathleen; Weyers, Jonathan D. B, How to write dissertations & project reports, Pearson, 2011
5. Cargill, Margaret; O'Connor, Patrick, Writing scientific research articles: strategy and steps, Wiley-Blackwell, 2009

Advanced Control Technology (ENGM007)

1. Katsuhiko Ogata, Modern Control Engineering, 5th Ed, Pearson, 2009
2. Norman S. Nise, Control Systems Engineering, 6th Ed. ,Wiley, 2011
3. Gene F. Franklin, J. David Powell, Abbas Emami-Naeini, Feedback Control of Dynamic Systems, 7th Edition, Pearson, 2015
4. Harold Klee, Randal Allen, Simulation of Dynamic Systems with MATLAB and Simulink, 2nd Edition, CRC Press, 2011

Condition Monitoring (ENGM008)

1. B.K.N. Rao, Handbook of Condition Monitoring, Springer, 1996
2. R. Barron, Engineering Condition Monitoring, Longman, 1996
3. J I Taylor, The Vibration Analysis Handbook, IPP Books, 1994
4. Lynn, Machinery Vibration Condition Monitoring, Butterworth, 1989
5. R. Barron Addison, Engineering condition Monitoring: Practice, Methods and Applications, Wesley Longman, 1996
6. J P Bentley, Principles of Measurement Systems, 4th Edition, Pearson, 2005
7. J D Turner, Instrumentation for Engineers, Macmillan, 1988

Professional Practice for Technologists (ENGM009)

1. John M. Nicholas and Herman Steyn, Project Management for Business, Engineers and Technology – Principles and Practice. 3rd Edition, Butterworth-Heinemann, 2008
2. Simon Robinson, Ross Dixon, Christopher Preece and Krisen Moodley, Engineering, Business and Professional Ethics 1st Edition, Butterworth-Heinemann, 2007

PREPARATION PRIOR TO STARTING THE COURSE

MSc level engineering study involves mathematics such as Laplace transformation, numerical analysis, probability and statistics. If you spend some time to familiarize yourself with such knowledge before starting the study, it will enormously save your future effort.

We find that student's find topics with mathematical content most challenging. The following links will provide useful information, which will prepare you prior to and during 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

MSc Engineering Welcome Week Timetable

	Monday 24 Sep	Tuesday 25 Sep	Wednesday 26 Sep	Thursday 27 Sep	Friday 28 Sep
9am – 10am				Team Building, 9:00-12:00, SN205 (with undergraduate)	
10am – 11am					Subject Session and End of Week, 10:00-11:00, LH120
11am – 12am	Welcome, 11:00-11:30, SN208 (with undergraduate)				
12am – 1pm		Skills Session, 12:00-15:00, SN110 (with undergraduate)			
1pm – 2pm					
2pm – 3pm					