# The Degree of Bachelor of Engineering with Honours (BE(Hons) – 480 points)

These regulations must be read in conjunction with the General Regulations for the University.

### 1. Version

These Regulations came into force on 1 January 2024.

### 2. Variations

In exceptional circumstances the Amo Matua, Pūhanga | Executive Dean of Engineering or delegate may approve a personal programme of study which does not conform to these Regulations.

### 3. The structure of the qualification

To qualify for the BE(Hons) a student must complete:

(a) a programme of study for First Year of not less than 120 points;
(b) an approved academic writing test;
(c) a Second, Third and Fourth Year programme where each year is not less than 120 points;
(d) a programme of study which must include not less than 120 points at 400-level or higher;
(e) ENGR200 Engineering Work Experience.

### 4. Admission to the qualification

(a) Admission to the BE(Hons) is by approval of the Amo Matua, Pūhanga | Executive Dean of Engineering or delegate.
(b) In addition, and principally on the basis of grades obtained, a student may qualify for admission to the Second Year programmes upon:
    i. successful completion of the First Year Programme; or
    ii. successful completion of an approved First Year Programme at another university; or
    iii. completion of appropriate NCEA Level 3 subjects, or the New Zealand University Entrance, Scholarships qualification in appropriate subjects, or in other examinations approved by the Amo Matua, Pūhanga | Executive Dean of Engineering or delegate; or
    iv. completion of a qualification from a tertiary institution.
(c) Notwithstanding Regulation 3 above, unless exempted from the First Year, a student will not be admitted to the Second Year without passing the whole First Year requirements in two years or less.
(d) The entire BE(Hons) First Year is a prerequisite for the Second Year.
(e) The Amo Matua, Pūhanga | Executive Dean of Engineering or delegate reserves the right to decline entry to a student who has been offered a place in the Second Year of the BE(Hons) degree and who has not completed their enrolment by the Friday preceding the first day of lectures of Semester 1.
(f) Special admission on the basis of Regulation 4(b)(iii) must be made by written application to the Amo Matua, Pūhanga | Executive Dean of Engineering or delegate. An interview may also be required.
(g) Special admission on the basis of Regulation 4(b)(iv) must be made by written application to the Amo Matua, Pūhanga | Executive Dean of Engineering or delegate. The Amo | Dean, in consultation with the relevant department Year Coordinator or Director of Studies, will consider the student's prior learning. In particular, their preparation in mathematics, physics, chemistry or computer science, and any relevant work experience in industry.

### 5. Subjects

(a) This qualification may be awarded in the following disciplines: Chemical and Process Engineering, Civil Engineering, Computer Engineering, Electrical and Electronic Engineering, Forest Engineering, Mechanical Engineering, Mechatronics Engineering, Natural Resources Engineering, and Software Engineering.
(b) The degree may also be completed with a Minor that denotes sub-specialisation within an engineering discipline.
(c) Any given course may contribute to only one major or minor.

### 6. Time limits

(a) The time limit for completion of the Second, Third and Fourth Years and work experience requirements of this qualification is 6 years of study.
(b) The Programmes of Study for full-time students are stipulated below. Students enrolled on a part-time basis must seek academic advice in relation to their enrolment.
(c) In the case of a student pursuing double degrees or suspension of studies, qualification timelines may be extended if approved by the Amo Matua, Pūhanga | Executive Dean of Engineering or delegate.
(d) A student who has an approved suspension of study for more than a calendar year may be required to undertake preparatory work prior to resuming studies in this qualification. Any preparatory programme of study must be completed while on suspension, and immediately prior to the end of their suspension.

### 7. Transfers of credit, substitutions and cross-credits

This qualification adheres to the Credit Recognition and Transfer Regulations, with no additional stipulations.

### 8. Progression

This qualification adheres to the General Regulations for the University, with the following stipulations:

(a) Introductory courses for Mathematics, Physics and Chemistry (MATH101, PHYS111 and CHEM114) may only be attempted twice in the BE(Hons) First Year. Students who fail introductory courses after the second attempt will be excluded from the BE(Hons) First Year.
(b) A student is not permitted to enrol in any engineering courses of the Fourth Year prior to completion of the Second Year.
(c) A student may enquire, from the Amo Matua, Pūhanga | Executive Dean of Engineering or delegate, as to the Kaupeka Pūhanga | Faculty of Engineering Guideline on the application of restricted credit as described in the General Conditions for Credit Regulations.

### 9. Honours, Distinction and Merit

(a) The BE(Hons) may be awarded with First, Second, or with Third Class Honours. Second Class Honours must be listed in Division I or Division II.
(b) Honours is awarded for academic achievement, measured by weighted GPA, 20% weighting on the Third Year and 80% on the Fourth Year, and completion of requirements within the time limitations of the BE(Hons). Where students have completed courses on exchange, these grades will be used in the calculation of honours. Only the first attempt of a course, or its substitute, will be considered in the calculation.
(c) In exceptional circumstances a student may be permitted by the Amo Matua, Pūhanga | Executive Dean of Engineering or delegate to complete all the requirements, both academic and non-academic, of the award outside the time limitation. In such circumstances the student will be awarded a Degree of Bachelor of Engineering.

### 10. Exit and Upgrade Pathways to other Qualifications

There are no advancing qualifications for the BE or BE(Hons).

### 11. First Year

(a) The Programme of Study consists of:
    i. All courses in Schedule A.
    ii. Courses from Schedule B to meet the entry requirements of at least one engineering discipline.
    iii. Additional courses, where required, to ensure a workload of not less than 120 points.
    iv. Subject to the approval of the Amo Matua, Pūhanga | Executive Dean of Engineering or delegate, a student may be approved into a modified First Year based on high achievement in NCEA or other equivalent examination, or through recognised prior learning at another tertiary institution.
(b) Schedule A – Compulsory for all Engineering First Year students
    i. ENGR100 Engineering Academic Skills*
    ii. ENGR101 Foundations of Engineering
    iii. EMTH118 Engineering Mathematics 1A
    iv. EMTH119 Engineering Mathematics 1B
    v. PHYS101 Engineering Physics A: Mechanics, Waves and Thermal Physics
    vi. COSC131 Introduction to Programming for Engineers

**ENGR100 is a zero-EFTS course (no fees).*

(c) Schedule B – Engineering disciplines
  i. Chemical and Process Engineering
    a. CHEM111 Chemical Principles and Processes
  ii. Civil Engineering, Forest Engineering, Mechanical Engineering, and Natural Resources Engineering
    a. CHEM111 Chemical Principles and Processes
    b. ENGR102 Engineering Mechanics
  iii. Computer Engineering, and Electrical and Electronic Engineering
    a. MATH120 Discrete Mathematics, or COSC122 Introduction to Computer Science
  iv. Mechatronics Engineering
    a. ENGR102 Engineering Mechanics
  v. Software Engineering
    a. COSC122 Introduction to Computer Science
    b. MATH120 Discrete Mathematics

### 12. Second to Fourth Year Programme

The Second to Fourth Years are laid out in Regulations 13–42.

A student should note the following:

(a) Not all elective courses will necessarily be available in any one year.
(b) A student may not attempt the Fourth Year project unless they will be completing their degree within 3 semesters or less.

## Pūhanga Matū, Tukanga | Chemical and Process Engineering

Note: Not all courses offered in a given year.

### 13. Second Year

(1) ENCH199 Workshop Training Course for Chemical and Process Engineering
(2) ENCH241 Engineering Chemistry 2
(3) ENCH281 Principles of Biology for Engineers
(4) ENCH291 Mass & Energy Balances
(5) ENCH292 Heat & Mass Transfer Operations
(6) ENCH293 Fluid Mechanics 1
(7) ENCH295 Chemical Engineering Professional Practice
(8) ENCH296 Chemical Engineering Thermodynamics
(9) ENCH298 Chemical Engineering Mathematics

### 14. Third Year

(1) ENCH 390 Process Analysis
(2) ENCH 391 Process Systems and Control
(3) ENCH 392 Thermodynamics and Chemical Reaction Engineering
(4) ENCH 393 Fluid Mechanics and Heat Transfer
(5) ENCH 394 Process Engineering Design 2
(6) ENCH 395 Process Engineering Laboratories
(7) ENCH 396 Chemical Engineering Separations 1
(8) One course selected from Schedule A listed below.

### 15. Fourth Year

(1) ENCH494 Process Engineering Design 3
(2) ENCH495 Research Project
(3) ENCH496 Advanced Separation
(4) ENCH497 Process Management
(5) One course selected from Schedule B listed below
(6) One course selected from either Schedule A or B listed below or any 400-level 15 point Engineering course

**Schedule A**

(1) ENGR404 Renewable Energy Technologies and Management
(2) ENCN375 Sustainable Engineering for a Changing Climate
(3) ENGR407 Bioprocess Engineering 1
(4) ENCH486 Special Topic in Chemical and Process Engineering
(5) ENNR405 Ecological and Bioresources Engineering

**Schedule B**

(1) ENGR401 Computational Fluid Dynamics
(2) ENGR405 Industrial Pollution Control
(3) ENCH482 Bioprocess Engineering 2
(4) ENCH483 Advanced Energy Processing Technologies and Systems
(5) ENCH487 Special Topic in Chemical and Process Engineering
(6) ENCH484 Advanced Modelling and Simulation
(7) Any 400-level Engineering course approved by the Director of Studies

### 16. Minor in Bioprocess Engineering

(1) ENCH281 Principles of Biology for Engineers
(2) ENGR407 Bioprocess Engineering 1
(3) ENCH482 Bioprocess Engineering 2
(4) ENCH494 Process Engineering Design 3*__OR__ENCH495 Research Project*

**Note: ENCH494 Process Engineering Design 3* __OR__*ENCH495 Research Project must be taken with an approved bioprocess engineering focus as approved by the Director of Studies. The Minor will only be awarded upon completion of all other normal requirement of BE(Hons) Chemical and Process Engineering.*

### 17. Minor in Sustainable Energy Engineering

(1) ENCH392 Thermodynamics and Chemical Reaction Engineering
(2) ENGR404 Emerging Energy Technologies and Management
(3) ENCH483 Advanced Energy Processing Technologies and Systems
(4) ENCH494 Process Engineering Design 3**__OR__ENCH495 Research Project**

***Note: ENCH494 Process Engineering Design 3* __OR__*ENCH495 Research Project must be taken with an approved sustainable energy engineering focus as approved by the Director of Studies. The Minor will only be awarded upon completion of all other normal requirement of BE(Hons) Chemical and Process Engineering.*

### 18. Minor in Environmental Process Engineering

(1) ENCH390 Process Engineering Design 1
(2) One of the following courses
    (a) ENGR407 Bioprocess Engineering 1; or
    (b) ENCN375 Systems Engineering for a Changing Climate
(3) ENGR405 Industrial Pollution Control
(4) ENCH494 Process Engineering Design 3*** OR ENCH495 Research Project***

****Note: ENCH494 Process Engineering Design 3* __OR__ *ENCH495 Research Project must be taken with an approved environmental process engineering focus as approved by the Director of Studies. The Minor will only be awarded upon completion of all other normal requirement of BE(Hons) Chemical and Process Engineering.*

## Pūhanga Metarahi | Civil Engineering

Note: Not all courses offered in a given year.

### 19. Second Year

(1) ENCI199 Health & Safety on the Worksite
(2) ENCN201 Communication Skills Portfolio 1
(3) ENCN205 Applied Data Analysis for Civil and Natural Systems
(4) EMTH210 Engineering Mathematics 2
(5) ENCN213 Design Studio 1

(6) ENCN221 Engineering Materials
(7) ENCN231 Solid Mechanics
(8) ENCN242 Fluid Mechanics and Hydrology
(9) ENCN253 Soil Mechanics
(10) ENCN281 Environmental Engineering

Note: Students are required to attend the Second Year Camp. Work at the camp will form part of the assessment for ENCN281 Environmental Engineering and ENCN201 Communication Skills Portfolio 1.

### 20. Third Year

(1) ENCN301 Communication Skills Portfolio 2
(2) ENCI335 Structural Analysis and Systems 1
(3) ENCN304 Deterministic Mathematical Methods
(4) ENCN342 Hydraulics and Applied Hydrology
(5) ENCN353 Geotechnical Engineering
(6) ENCN361 Transportation Engineering
(7) ENCN371 Project and Infrastructure Management
(8) ENCN375 Systems Engineering for a Changing Climate
(9) Either:
    (a) ENCI336 Behaviour and Design of Structures 1, or
    (b) ENCN347 Stormwater Systems Engineering

### 21. Fourth Year

(1) ENCN493 Project
(2) ENCI413 Integrated Civil Engineering Design
(3) Sufficient courses selected from:
    (a) ENCI436 Behaviour and Design of Structures 2
    (b) ENCI437 Structural Analysis and Systems 2
    (c) ENCI438 Introduction to Structural Earthquake Engineering
    (d) ENCN401 Engineering in Developing Communities
    (e) ENCN405 Ecologically Engineered Systems
    (f) ENCN412 Traffic Engineering
    (g) ENCN415 Pavement Engineering
    (h) ENCN423 Sustainable Energy Systems
    (i) ENCN441 Fluid Mechanics of Environmental Systems
    (j) ENCN442 Integrated Surface Water and Groundwater Engineering
    (k) ENCN 446 Fluid Mechanics of Built Systems
    (l) ENCN452 Advanced Geotechnical Engineering
    (m) ENCN454 Introduction to Geotechnical Earthquake Engineering
    (n) ENCN482 Site Assessment and Remediation
    (o) ENGR403 Fire Engineering
    (p) Any 15 point 400-level option to be approved by the Director of Studies
    (q) Students with a GPA of 6 or more may apply to take one 600-level course approved by the Director of Studies.

### 22. Minor in Structural Engineering

(1) ENCI436 Behaviour and Design of Structures 2
(2) ENCI438 Introduction to Structural Earthquake Engineering
(3) ENCN493 Project*

**Note: ENCN493 Project must have a structural engineering focus as approved by the Director of Studies. The Minor will only be awarded upon completion of all other normal requirements of BE(Hons) Civil Engineering.*

### 23. Minor in Water and Environmental Systems Engineering

(1) Three of the following courses:
  (a) ENCN405 Ecologically Engineered Systems
  (b) ENCN441 Fluid Mechanics of Environmental Systems
  (c) ENCN442 Integrated Surface Water and Groundwater Engineering
  (d) ENCN446 Fluid Mechanics of Built Systems
  (e) ENCN482 Site Assessment and Remediation
  (f) ENGR409 Design of Drinking Water and Wastewater Treatment Systems
  (g) An appropriate course approved by the Director of Studies
(2) ENCN493 Project**

***Note: ENCN493 Project must have a water and environmental systems engineering focus as approved by the Director of Studies. The Minor will only be awarded upon completion of all other normal requirements of BE(Hons) Civil Engineering.*

## Pūhanga Rorohiko | Computer Engineering

Note: Not all courses offered in a given year.

### 24. Second Year

(1) ENEL198 Electrical Workshop Course
(2) ENEL199 Basic Workshop Course
(3) EMTH210 Engineering Mathematics 2
(4) EMTH211 Engineering Linear Algebra and Statistics
(5) ENCE260 Computer Systems
(6) ENEL200 Electrical and Computer Engineering Design
(7) ENEL220 Circuits and Signals
(8) ENEL270 Principles of Electronics and Devices
(9) SENG201 Software Engineering 1
(10) Either:
  (a) COSC264 Introduction to Computer Networks and the Internet, or
  (b) COSC265 Relational Database Systems

### 25. Third Year

(1) ENCE361 Embedded Systems 1
(2) ENEL300 Electrical and Computer Engineering Design 2
(3) ENEL301 Fundamentals of Engineering Economics and Management
(4) ENEL320 Signals and Communications
(5) ENEL321 Control Systems
(6) ENEL373 Digital Electronics and Devices
(7) Sufficient courses selected from:
  (a) ENCE360 Operating Systems
  (b) COSC362 Data and Network Security
  (c) COSC363 Computer Graphics
  (d) COSC364 Internet Technology and Engineering
  (e) COSC368 Humans and Computers
  (f) SENG301 Software Engineering 2
  (g) SENG365 Web Computing Architectures
  (h) Any 15 point 300-level option to be approved by the Director of Studies

### 26. Fourth Year

(1) ENEL400 Electrical and Computer Engineering Research Project
(2) ENCE461 Embedded Systems 2
(3) ENCE464 Embedded Software and Advanced Computing
(4) Sufficient courses selected from:

(a) COSC411 Advanced Topics in HCI
(b) COSC422 Advanced Computer Graphics
(c) SENG406 Software Security
(d) COSC428 Computer Vision
(e) COSC441 Wireless Networking Systems and Performance
(f) ENEL420 Advanced Signals
(g) ENEL422 Communications Engineering
(h) ENEL491 Nano Engineered Electronics Devices
(i) ENME403 Linear Systems Control and System Identification
(j) ENMT482 Robotics
(k) Any 15 point 400-level option to be approved by the Director of Studies

### 27. Minor in Communications and Network Engineering

(1) COSC264 Introduction to Computer Networks and the Internet
(2) COSC364 Internet Technology and Engineering
(3) COSC441 Wireless Networking Systems and Performance
(4) ENEL320 Signals and Communications
(5) ENEL400 Electrical and Computer Engineering Research Project
(6) ENEL422 Communications Engineering

## Pūhanga Hiko | Electrical and Electronic Engineering

Note: Not all courses offered in a given year.

### 28. Second Year

(1) ENEL198 Electrical Workshop Course
(2) ENEL199 Basic Workshop Course
(3) EMTH210 Engineering Mathematics 2
(4) EMTH211 Engineering Linear Algebra and Statistics
(5) ENEL200 Electrical and Computer Engineering Design
(6) ENEL220 Circuits and Signals
(7) ENEL270 Principles of Electronics and Devices
(8) ENEL280 Principles of Electrical Systems
(9) ENEL290 Waves and Materials in Electrical Engineering
(10) ENCE260 Computer Systems

### 29. Third Year

(1) ENCE361 Embedded Systems 1
(2) ENEL300 Electrical and Computer Engineering Design 2
(3) ENEL301 Fundamentals of Engineering Economics and Management
(4) ENEL320 Signals and Communications
(5) ENEL321 Control Systems
(6) ENEL372 Power and Analogue Electronics
(7) ENEL373 Digital Electronics and Devices
(8) ENEL382 Electric Power and Machines

### 30. Fourth Year

(1) ENEL400 Electrical and Computer Research Project
(2) Sufficient courses selected from:
    (a) ENCE461 Embedded Systems 2
    (b) ENCE464 Embedded Software and Advanced Computing
    (c) ENEL420 Advanced Signals
    (d) ENEL422 Communications Engineering
    (e) ENEL471 Power Electronics 2
    (f) ENEL480 Electrical Power Systems
    (g) ENEL481 Electrical Machines

(h) ENEL491 Nano Engineered Electronics
(i) ENEL 667 Renewable Electricity System Design
(j) ENME403 Linear Systems Control and System Identification
(k) ENMT482 Robotics
(l) Any 15 point 400-level or higher option to be approved by the Director of Studies

### 31. Minor in Power Engineering

(1) ENEL480 Power Systems
(2) ENEL372 Power and Analogue Electronics
(3) ENEL382 Electric Power and Machines
(4) And two of the following:
  (a) ENEL481 Electrical Machines
  (b) ENEL471 Power Electronics
  (c) ENEL667 Renewable Energy Systems Design

## Pūhanga Ngahere | Forest Engineering

Note: Not all courses offered in a given year.

### 32. Second Year

(1) FORE199 Workshop Training Course
(2) EMTH210 Engineering Mathematics 2
(3) FORE205 Introduction to Forest Engineering
(4) FORE215 Introduction to Forest Economics
(5) ENCN213 Design Studio 1
(6) ENCN221 Engineering Materials
(7) ENCN231 Solid Mechanics
(8) ENCN253 Soil Mechanics
(9) ENFO204 Forest Measurement

### 33. Third Year

(1) ENCN305 Computer Programming and Stochastic Modelling
(2) ENCN353 Geotechnical Engineering
(3) ENCN371 Project and Infrastructure Management
(4) ENFO327 Wood Science
(5) ENNR320 Integrated Catchment Analysis or ENCI335 Structural Analyses
(6) FORE316 Forest Management
(7) FORE342 Geospatial Science in Forest Monitoring and Management

Note: A student is required to attend the Third Year Camp. Work at the camp will form part of the assessment for ENCN371 Infrastructure Management.

### 34. Fourth Year

(1) FORE422 Forest Harvest Planning
(2) FORE423 Forest Transportation and Road Design
(3) ENFO410 Forest Engineering Research
(4) ENFO499 Industry Field Programme (0 points)
(5) Sufficient courses selected from:
  (a) FORE426 Forest Products Marketing and International Trade
  (b) FORE435 Advanced Forest Economics 2
  (c) FORE443 Biosecurity Risk Management
  (d) ENGR403 Fire Engineering
  (e) ENGR406 Wood and Engineered Wood Products Processing
  (f) ENNR423 Sustainable Energy Systems
  (g) ENCN415 Pavement Engineering
  (h) ENCN452 Advanced Geotechnical Engineering
  (i) ENGE412 Rock Mechanics and Rock Engineering
  (j) Any 15 point 400-level option to be approved by the Director of Studies

## Mechanical Engineering

Note: Not all courses offered in a given year.

### 35. Second Year

(1) ENME199 Workshop Training Course for Mechanical and Mechatronics Engineering
(2) EMTH210 Engineering Mathematics 2
(3) EMTH271 Mathematical Modelling and Computation 2
(4) ENME201 Design Communication
(5) ENME202 Stress, Strain and Deformation in Machine Elements
(6) ENME203 Dynamics and Vibrations
(7) ENME207 Materials Science and Engineering
(8) ENME215 Engineering Thermodynamics
(9) ENME221 Engineering Design and Manufacture

### 36. Third Year

(1) ENME301 Engineering Design and Production Quality
(2) ENME302 Computational and Applied Mechanical Analysis
(3) ENME303 Controls and Vibrations
(4) ENME307 Performance of Engineering Materials
(5) ENME313 Electro Technology for Mechanical Engineers
(6) ENME314 Fluid Mechanics
(7) ENME315 Heat Transfer
(8) Either
    (a) ENME311 Engineering Design and Production Management
    (b) ENME351 Biomedical Design & Production Management
    (c) ENME362 Aerospace Design Principles and Production Management

### 37. Fourth Year

(1) ENME408 Honours Research and Development Project
(2) ENME401 Mechanical Systems Design
(3) ENME418 Engineering Management and Professional Practice for Mechanical Engineers
(4) Sufficient courses selected from:
    (a) ENGR401 Computational Fluid Dynamics
    (b) ENME402 Acoustics and Vibrations
    (c) ENME403 Linear Systems Control and System Identification
    (d) ENME404 Aerodynamics and Ground Vehicle Dynamics
    (e) ENME405 Energy Systems Engineering
    (f) ENME406 Engineering Product Design and Analysis
    (g) ENME407 Advanced Materials Science and Engineering
    (h) ENME409 Physiological Modelling
    (i) ENME411 Advanced Mechanical System Design
    (j) ENME412 Advanced Vibrations
    (k) ENME417 Advanced Composite, Polymeric and Ceramic Materials
    (l) ENME423 Instrumentation and Sensors
    (m) ENME427 Engineering Failure Analysis and Prevention
    (n) ENME460 Aerospace Propulsion
    (o) ENME465 Heating Ventilation and Air Conditioning (HVAC) Engineering
    (p) ENME480 Independent Course of Study
    (q) ENME481 Special Topic – Materials That Shape Civilization
    (r) ENME484 Special Topic – Industry 4.0 Intelligent Manufacturing
    (s) ENME486 Special Topic - Aerospace Structures
    (t) MDPH401 Anatomy and Physiology
    (u) ENMT482 Robotics
    (v) ENME451 Biomechanics
    (w) Any 15 point 400-level option approved by the Director of Studies

### 38. Minor in Aerospace Engineering

(1) ENME362 Aerospace Design Principles and Production Management
(2) ENME408 Honours Research & Development Project
(3) Plus 30 points of the following:
    (a) ENGR401 Computational Fluid Dynamics
    (b) ENME404 Aerodynamics and Ground Vehicle Dynamics
    (c) ENME460 Aerospace Propulsion
    (d) ENME486 Aerospace Structures
    (e) Any 15 point 400 level relevant course approved by the Director of Studies

*Note: ENME408 Honours Research and Development Project must be taken with an approved aerospace engineering focus as approved by the Director of Studies.*

### 39. Minor in Biomedical Engineering

(1) ENME351 Biomedical Design & Production Management
(2) ENME401 Mechanical Systems Design
(3) ENME408 Honours Research & Development Project
(4) ENME418 Engineering Management and Professional Practice for Mechanical Engineers
(5) MDPH401 Anatomy and Physiology
(6) Plus 15 points of the following:
    (a) DATA430 Medical Data Informatics
    (b) ENME409 Physiological Simulation
    (c) ENME451 Biomechanics
    (d) MDPH406 Medical Imaging

*Note: ENME401 Mechanical Systems Design and ENME408 Honours Development Project must be taken with an approved biomedical engineering focus as approved by the Director of Studies.*

## Mechatronics Engineering

Note: Not all courses offered in a given year.

### 40. Second Year

(1) ENEL198 Electrical Workshop Course
(2) ENME199 Workshop Training Course for Mechanical and Mechatronics Engineering
(3) EMTH210 Engineering Mathematics 2
(4) EMTH211 Engineering Linear Algebra and Statistics
(5) ENCE260 Computer Systems
(6) ENEL270 Principles of Electronics and Devices
(7) ENME202 Stress, Strain and Deformation in Machine Elements
(8) ENME203 Dynamics and Vibrations
(9) ENMT211 Principles of Mechatronics or ENMT201 Mechatronics Design
(10) ENMT221 Mechatronics Design 1 or ENMT201 Mechatronics Design

### 41. Third Year

(1) ENCE361 Embedded Systems 1
(2) ENEL301 Fundamentals of Engineering Economics and Management
(3) ENEL372 Power and Analogue Electronics
(4) ENME302 Computational and Applied Mechanical Analysis
(5) ENME303 Controls and Vibrations
(6) ENMT301 Mechatronics System Design
(7) Sufficient courses selected from:
    (a) ENME215 Engineering Thermodynamics
    (b) ENME314 Fluid Mechanics
    (c) ENEL373 Digital Electronics and Devices
    (d) Any 15 point 300-level option to be approved by the Director of Studies

### 42. Fourth Year

(1) ENMT401 Mechatronics Honours Research and Development Project
(2) ENCE461 Embedded Systems 2
(3) ENME403 Linear Systems Control and System Identification
(4) Sufficient courses selected from:
  (a) ENMT482 Robotics
  (b) COSC401 Machine Learning
  (c) COSC428 Computer Vision
  (d) ENEL422 Communications Engineering
  (e) ENCE464 Embedded Software and Advanced Computing
  (f) ENEL471 Power Electronics 2
  (g) ENEL491 Nano Engineered Devices
  (h) ENME402 Acoustics and Vibrations
  (i) ENME404 Aerodynamics and Ground Vehicle Dynamics
  (j) ENME406 Engineering Product Design and Analysis
  (k) ENME423 Instrumentation and Sensors
  (l) ENME451 Biomechanics
  (m) Any 15 point 400-level option to be approved by the Director of Studies

## Natural Resources Engineering

Note: Not all courses offered in a given year.

### 43. Second Year

(1) ENCI199 Health & Safety on the Worksite
(2) ENCN201 Communication Skills Portfolio 1
(3) EMTH210 Engineering Mathematics 2
(4) ENCN205 Applied Data Analysis for Civil and Natural Systems
(5) ENCN213 Design Studio 1
(6) ENCN221 Engineering Materials
(7) ENCN231 Solid Mechanics
(8) ENCN242 Fluid Mechanics and Hydrology
(9) ENCN253 Soil Mechanics
(10) ENCN281 Environmental Engineering

*Note: Students are required to attend the Second Year Camp. Work at the camp will form part of the assessment for ENCN281 Environmental Engineering and ENCN201 Communication Skills Portfolio 1.*

### 44. Third Year

(1) ENCN301 Communication Skills Portfolio 2
(2) ENCI335 Structural Analysis and Systems 1
(3) ENCN304 Deterministic Mathematical Methods
(4) ENCN342 Hydraulics and Applied Hydrology
(5) ENCN347 Stormwater Systems Engineering
(6) ENCN353 Geotechnical Engineering
(7) ENCN361 Transportation Engineering
(8) ENCN371 Project and Infrastructure Management
(9) ENCN375 Systems Engineering for a Changing Climate

### 45. Fourth Year

(1) ENCN493 Project
(2) ENNR413 Integrated Natural Resources Design
(3) Sufficient courses selected from:
  (a) ENCN401 Engineering in Developing Communities
  (b) ENCN405 Ecologically Engineered Systems
  (c) ENCN412 Traffic Engineering

(d) ENCN415 Pavement Engineering
(e) ENCN423 Sustainable Energy Systems
(f) ENCN441 Fluid Mechanics of Environmental Systems
(g) ENCN442 Integrated Surface Water and Groundwater Engineering
(h) ENCN446 Fluid Mechanics of the Built Environment
(i) ENCN452 Advanced Geotechnical Engineering
(j) ENCN454 Introduction to Geotechnical Earthquake Engineering
(k) ENCN482 Site Assessment and Remediation
(l) ENGR403 Fire Engineering
(m) ENGR409 Design of Drinking Water and Wastewater Treatment Systems
(n) WATR403 Water Management, Policy, and Planning
(o) Any 15 point 400-level option to be approved by the Director of Studies
(p) Students with a GPA of 6 or more may apply to take one 600-level course approved by the Director of Studies.

## Software Engineering

Note: Not all courses offered in a given year.

### 46. Second Year

(1) SENG199 Software Engineering Workshop Training Course
(2) SENG201 Software Engineering 1
(3) SENG202 Software Engineering Project Workshop
(4) COSC261 Formal Languages and Compilers
(5) COSC262 Algorithms
(6) COSC265 Relational Database Systems
(7) ENCE260 Computer Systems
(8) Sufficient courses selected from schedules A and B below. Course selection must include at least one course from Schedule A.

**Schedule A**

(1) EMTH210 Engineering Mathematics 2
(2) MATH220 Discrete Mathematics and Cryptography

**Schedule B**

(1) COSC264 Introduction to Computer Networks and the Internet
(2) EMTH211 Engineering Linear Algebra and Statistics
(3) MATH230 Logic, Automata, and Computability

### 47. Third Year

(1) SENG301 Software Engineering II
(2) SENG302 Software Engineering Group Project
(3) SENG365 Web Computing Architectures
(4) COSC368 Humans and Computers
(5) ENEL301 Fundamentals of Engineering Economics and Management
(6) Sufficient courses selected from:
    (a) COSC362 Network and Data Security
    (b) COSC363 Computer Graphics
    (c) COSC364 Internet Technology and Engineering
    (d) COSC367 Computational Intelligence
    (e) DATA301 Big Data Computing and Systems
    (f) ENCE360 Operating Systems
    (g) ENCE361 Embedded Systems 1
    (h) Any 15 point 300-level option to be approved by the Director of Studies

### 48. Fourth Year

(1) SENG401 Software Engineering III
(2) SENG402 Software Engineering Research Project
(3) SENG406 Software Security
(4) Sufficient 400-level courses selected from COSC, SENG, ENCE, and DATA430–439 approved by the Director of Studies