Engineering

Faculty of Engineering and Design

This section presents the requirements for:

- **Aerospace Engineering with streams:**
  - **Aerodynamics, Propulsion and Vehicle Performance**
  - **Aerospace Structures, Systems and Vehicle Design**
  - **Aerospace Electronics and Systems**
- **Civil Engineering**
- **Civil Engineering with Concentration in Management**
- **Communications Engineering**
- **Computer Systems Engineering**
- **Electrical Engineering**
- **Engineering Physics**
- **Environmental Engineering**
- **Mechanical Engineering**
- **Mechanical Engineering with Concentration in Computer Integrated Manufacturing**
- **Software Engineering**

Graduation Requirements

In addition to the requirements listed below, students must satisfy:

i) the University regulations including the process of Academic Performance Evaluation (see the *Academic Regulations of the University* section of this Calendar),

ii) the Faculty regulations applying to all B.Eng. programs (see *Academic Regulations and Requirements for the Bachelor of Engineering Degree*).

Students should consult with their Department when planning their program and selecting courses.

Course Categories for Engineering Programs

The following categories of courses are used in defining the programs.

- **Complementary Studies Electives**

Courses in this classification must be chosen from among those listed below. English as Second Language courses are not acceptable for use as Complementary Studies electives in any engineering program. Higher level courses may be used to fulfil a Complementary Studies elective requirements with the permission of the Faculty of Engineering and Design and provided all other specified course requirements are met. Registration in ITV sections is not acceptable.

Note: access to these courses is not guaranteed and may depend on space availability and satisfaction of other requirements, for example course prequisites and specific year or program standing.

Courses with 0.5 credit weight

BUSI 2101, BUSI 3102, BUSI 3103, BUSI 3600, BUSI 4105, BUSI 4607, CGSC 2001, CLST 2007, CLST 2008, ECON 2002, ECON 2003, ECON 2102, ECON 2103, ISCI 2002, MUSI 1001, PHIL 1001, PHIL 1002, PHIL 1501, PHIL 1804, PHIL 2001, PHIL 2003, PSCI 1001, PSCI 1002, PSCI 1102, RELI 1001, SPAN 2100, SPAN 2101, TSES 3001, TSES 3002

Courses with 1.0 credit weight

ANTH 1000, CLCV 2000, CLST 1000, CLST 2001, ECON 1000, ENGL 1000, ENGL 1001, ENGL 1602, EURR 2000, FILM 1000, FILM 2000, GERM 2400, HIST 1001, HIST 1002, HIST 1705, HIST 2100, HIST 2201, HIST 2202, HIST 2203, HIST 2205, HIST 2303, HIST 2304, HIST 2306, HIST 2307, HIST 2400, HIST 2500, HIST 2504, HIST 2509, HIST 2600, HIST 2705, HIST 2708, HIST 2801, HIST 2805, HIST 2806, ITAL 1500, PHIL 1100, PHIL 1500, PHIL 1600, SOCI 1000, SOWK 1000, WOMN 1808

- **Breadth Electives for Communications Engineering**

SYSC 3601/ELEC 4601, SYSC 4507, SYSC 4005, SYSC 3303, SYSC 4800, ELEC 4503, ELEC 4509, ELEC 4706, ELEC 4707, ELEC 4708

- **Science Electives for Electrical Engineering**

a) All courses in Biochemistry (BIOC)

b) All courses in Biology (BIOL) except BIOL 1902, BIOL 1903 and BIOL 2106

c) All courses in Chemistry (CHEM) except CHEM 1003

d) All courses in Geology (GEOL)

e) All courses in Mathematics and Statistics (MATH, STAT) except MATH 1002, MATH 1007, MATH 1009, MATH 1102, MATH 1107, MATH 1109, MATH 2007, MATH 2008, MATH 2009, MATH 2000, MATH 2404, MATH 2454, STAT 2507, STAT 2605, STAT 2606

f) All physics courses (PHYS) except PHYS 1900, PHYS 1901, PHYS 1902, PHYS 2101, PHYS 2305, PHYS 2306, PHYS 3308

- **Approved Science and Computer Science Electives for Software Engineering**

Consult the Department of Systems and Computer Engineering for a list of these electives.

Program Requirements

Aerospace Engineering
Bachelor of Engineering (21.0 credits)

Students in Aerospace Engineering must satisfy the requirements for one of the following streams:

Aerospace Engineering Stream A: Aerodynamics, Propulsion and Vehicle Performance

First Year

1. 4.0 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606;
2. 1.0 credit in Complementary Studies Electives;

Second Year

3. 5.0 credits in MATH 2004, MATH 3705, MAAE 2001, MAAE 2101, MAAE 2202, MAAE 2300, MAAE 2400, MAAE 2700, ECOR 2606, ALSS 1000;

Third Year

4. 5.0 credits in STAT 3502, MAAE 3004, MAAE 3202, MAAE 3300, MAAE 3400, MAAE 3901, AERO 3002, AERO 3700, SYSC 3600, ELEC 3605;

Fourth Year

5. 4.5 credits in MAAE 4500, MAAE 4905, AERO 4003, AERO 4302, AERO 4306, AERO 4308, AERO 4907 [1.0], ECOR 3800;
6. 1.5 credits in Mechanical and Aerospace Engineering (MAAE, AERO or MECH) at the 4000-level or ELEC 4504.

Aerospace Engineering Stream B:
Aerospace Structures, Systems and Vehicle Design

First Year

1. 4.0 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606;
2. 1.0 credit in Complementary Studies Electives;

Second Year

3. 5.0 credits in MATH 2004, MATH 3705, MAAE 2001, MAAE 2101, MAAE 2202, MAAE 2300, MAAE 2400, MAAE 2700, ECOR 2606, ALSS 1000;

Third Year

4. 5.0 credits in STAT 3502, MAAE 3004, MAAE 3202, MAAE 3300, MAAE 3901, AERO 3002, AERO 3101, AERO 3700, SYSC 3600, ELEC 3605;

Fourth Year

5. 4.5 credits in MAAE 4500, MAAE 4102, MAAE 4905, AERO 4003, AERO 4602, AERO 4608, AERO 4907 [1.0], ECOR 3800;
6. 1.5 credits in Mechanical and Aerospace Engineering (MAAE, AERO or MECH) at the 4000-level or ELEC 4504.

Aerospace Engineering Stream C:
Aerospace Electronics and Systems

First Year

1. 4.5 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606, ALSS 1000;
2. 0.5 credit in Complementary Studies Electives;

Second Year

3. 5.0 credits in MATH 2004, MATH 3705, MAAE 2001, MAAE 2101, MAAE 2202, MAAE 2700, ELEC 2501, ECOR 2606, ELEC 2607, ELEC 2507;

Third Year

4. 5.0 credits in STAT 3502, MAAE 2400, MAAE 3202, AERO 3002, SYSC 3501, SYSC 3600, ELEC 3500, ELEC 3509, ELEC 3105, ELEC 3909;

Fourth Year

5. 3.0 credits in MAAE 4905, AERO 4003, AERO 4907 [1.0], ECOR 3800, MAAE 4500;
6. 1.5 credit from: AERO 4801, ELEC 4505, SYSC 4600, ELEC 4503;
7. 1.0 credit from: SYSC 4405, ELEC 4502, ELEC 4509, ELEC 4600, ELEC 4706;
8. 0.5 credit in Complementary Studies Electives.

Civil Engineering
Bachelor of Engineering (21.5 credits)

First Year

1. 4.5 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606, ALSS 1000;
2. 0.5 credit in Complementary Studies Electives;

Second Year

3. 5.0 credits in GEOL 2404, MATH 2004, MATH 3705, CIVE 2004, CIVE 2101, CIVE 2200, CIVE 2700, MAAE 2300, MAAE 2400, ECOR 2606;

Third Year

4. 5.0 credits in STAT 2507, CIVE 3202, CIVE 3203, CIVE 3204, CIVE 3205, CIVE 3206, CIVE 3208, CIVE 3304, ECOR 3800, ELEC 3605;
5. 0.5 credit in Complementary Studies Electives;

Fourth Year

6. 2.5 credits in CIVE 4208, CIVE 4209, CIVE 4407, CIVE 4905, CIVE 4908;
7. 2.5 credits either as:

   a) i) 1.5 credits from: CIVE 4200, CIVE 4302, CIVE 4303, ENVE 3003, CIVE 4400, CIVE 4403;

   ii) 1.0 credit from: CIVE 4201, CIVE 4202, CIVE 4301, CIVE 4307, CIVE 4308, CIVE 4500;

   or

   b) i) 1.0 credit in CIVE 4907 [1.0] and

   ii) 1.0 credit from: CIVE 4200, CIVE 4302, CIVE 4303, CIVE 4400, CIVE 4403, ENVE 3003;

   (iii) 0.5 credit from: CIVE 4201, CIVE 4202, CIVE 4301, CIVE 4307, CIVE 4308, CIVE 4500;
8. 1.0 credit in Complementary Studies Electives.

Civil Engineering with Concentration in Management
Bachelor of Engineering (21.5 credits)

First Year

1. 4.5 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606, ALSS 1000;
2. 0.5 credit in Complementary Studies Electives.

Second Year

3. 5.0 credits in BUSI 1001, BUSI 1002, GEOL 2404, MATH 2004, CIVE 2004, CIVE 2101, CIVE 2200, CIVE 2700, MAAE 2300, ECOR 2606;

Third Year

4. 5.5 credits in BUSI 2101, STAT 2507, CIVE 3202, CIVE 3203, CIVE 3204, CIVE 3205, CIVE 3206, CIVE 3208, CIVE 3304, ECOR 3800, ELEC 3605;

Fourth Year

5. 2.0 credits in CIVE 4400, CIVE 4905, CIVE 4908, SYSC 3200;
6. 1.5 credits from: CIVE 4200, CIVE 4208, CIVE 4302, CIVE 4303, CIVE 4403, CIVE 4407, ENVE 3003;
7. 0.5 credit in either BUSI 2204 or BUSI 3103;
8. 1.0 credit from CIVE 4201, CIVE 4202, CIVE 4209, CIVE 4301, CIVE 4307, CIVE 4308, CIVE 4500;
9. 1.0 credit from BUSI 3102, BUSI 3600, BUSI 4105, BUSI 4305, BUSI 4607.

Note: credit in CIVE 4907 [1.0] may replace 0.5 credit under Item 6 and 0.5 credit under Items 7, 8 and 9.

Communications Engineering
Bachelor of Engineering (21.0 credits)

First Year

1. 4.0 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606;

2. 1.0 credit in Complementary Studies Electives;

Second Year

3. 5.0 credits in MATH 2004, SYSC 2001, SYSC 2002, ELEC 2501, ALSS 1000, MATH 3705, SYSC 2003, SYSC 2500, ELEC 2507, ELEC 2607;

Third Year

4. 4.5 credits in STAT 2605, ELEC 3509, SYSC 3502, ELEC 3500, ELEC 3909, SYSC 3503, SYSC 4405, ECOR 3800, SYSC 2004;
5. 0.5 credits in Breadth Electives;

Fourth Year

6. 4.0 credit in SYSC 4909 [1.0], SYSC 4604, SYSC 4504, SYSC 3905, SYSC 4602, SYSC 4700, SYSC 4701;
7. 0.5 credits in Breadth Electives;
8. 0.5 credits in Breadth Electives or Systems and Computer (SYSC) or Electronics (ELEC) at the 4000-level;
9. 1.0 credit in Complementary Studies Electives.

Computer Systems Engineering Bachelor of Engineering (21.0 credits)

First Year

1. 4.5 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606, ALSS 1000;
2. 0.5 credit in Complementary Studies Electives;

Second Year

3. 5.0 credits in MATH 2004, MATH 3705, MAAE 2101, SYSC 2001, SYSC 2002, SYSC 2003, SYSC 2004, ELEC 2501, ELEC 2507, ELEC 2607;

Third Year

4. 5.0 credits in STAT 3502, ECOR 3800, SYSC 3001, SYSC 3100, SYSC 3303, SYSC 3501, SYSC 3600, SYSC 3601, SYSC 3905, ELEC 3500;

Fourth Year

5. 2.5 credits in SYSC 4507, SYSC 4602, SYSC 4800, SYSC 4805, ELEC 4705;
6. 1.0 credit in either SYSC 4908 [1.0] or ELEC 4908 [1.0];
7. 1.5 credits from: MECH 4503, ECOR 2606 or Systems and Computer (SYSC) or Electronics (ELEC) at the 3000-level or above;
8. 1.0 credit in Complementary Studies Electives.

Note: for Requirement 6 above, students should register in SYSC 4908 if their supervisor is in Systems and Computer Engineering, and in ELEC 4908 if their supervisor is in Electronics.

Electrical Engineering Bachelor of Engineering (21.0 credits)

First Year

1. 4.0 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606;
2. 1.0 credit in Complementary Studies Electives;

Second Year

3. 4.5 credits in MATH 2004, ECOR 2606, ELEC 2501, SYSC 2002, MATH 3705, SYSC 2004, ELEC 2507, ELEC 2607, ALSS 1000;
4. 0.5 credit in Complementary Studies;

Third Year

5. 5.0 credit in SYSC 3600, ELEC 3509, ELEC 3500, ELEC 3908, ELEC 3105, STAT 3502, SYSC 3006, SYSC 3501, ELEC 3905, ELEC 3909;

Fourth Year

6. 1.0 credit in ELEC 4601, ECOR 3800;
7. 1.0 credit in either SYSC 4907 [1.0] or ELEC 4907 [1.0];
8. 3.0 credits from: AERO 4300, MECH 4403, MECH 4503, MECH 4705, SYSC 3100, SYSC 3200, or Systems and Computer(SYSC) or Electronics (ELEC) at the 4000-level;
9. 0.5 credit either in Science Electives for Electrical Engineering or in ENVE, CIVE, IDES, MAAE, AERO, MECH at the 2000-level or above, AERO 4300, MECH 4403, MECH 4503, MECH 4705, SYSC 3100, SYSC 3200, or any Systems and Computer (SYSC) or Electronics (ELEC) at the 4000-level.
10. 0.5 credit in Complementary Studies.

Note: for Requirement 7 above, students should register in ELEC 4907 if their supervisor is in Electronics, and in SYSC 4907 if their supervisor is in Systems and Computer Engineering.

Engineering Physics Bachelor of Engineering (21.5 credits)

First Year

1. 4.5 credits in ALSS 1000, CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1001, PHYS 1002, ECOR 1606, ELEC 1908;
2. 0.5 credit in Complementary Studies Electives;

Second Year

3. 5.0 credits in MATH 2004, MATH 3705, PHYS 2202, PHYS 2604, SYSC 2002, SYSC 2004, ECOR 2606, ELEC 2501, ELEC 2507, ELEC 2607;

Third Year

4. 5.5 credits in STAT 3502, PHYS 3606, PHYS 3701, PHYS 3807, SYSC 3501, ELEC 3105, ELEC 3500, ELEC 3509, ELEC 3908, ELEC 3909, SYSC 3600;

Fourth Year

5. 3.0 credits in PHYS 4007, PHYS 4707, ECOR 3800, ELEC 3905, ELEC 4907 [1.0];
6. 1.0 credit in Physics (PHYS) at the 4000-level, which must include one of: PHYS 4203, PHYS 4208, PHYS 4409, PHYS 4508, PHYS 4807;
7. 1.0 credit in Electronics (ELEC) at the 4000-level, which must include one of: ELEC 4503, ELEC 4505, ELEC 4506, ELEC 4601, ELEC 4609, ELEC 4700, ELEC 4502, ELEC 4509, ELEC 4702, ELEC 4706, ELEC 4707, ELEC 4708;
8. 1.0 credit in Complementary Studies Electives.

Environmental Engineering Bachelor of Engineering (21.0 credits)

First Year

1. 5.0 credit in CHEM 1000 [1.0], MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606, ALSS 1000;

Second Year

2. 5.0 credits in CHEM 2800, GEOL 2404, MATH 2004,

STAT 2507, ENVE 2001, ENVE 2002, CIVE 2200, MAAE 2300, MAAE 2400, ECOR 2606;

Third Year

3. 5.0 credits in BIOL 3604, CHEM 2302, ENVE 3001, ENVE 3002, ENVE 3003, ENVE 3004, CIVE 2700, CIVE 3208, CIVE 4307, ECOR 3800;

Fourth Year

4. 3.5 credit in ENVE 4003, ENVE 4005, ENVE 4006, ENVE 4101, ENVE 4104, ENVE 4908, CIVE 4905;
5. 1.5 credits from: ENVE 4907 [1.0], ENVE 4002, CIVE 3304, CIVE 4208, CIVE 4301, CIVE 4303, CIVE 4400, MECH 4401, MECH 4403, MECH 4406, MECH 4407, SYSC 3200;
6. 1.0 credit in Complementary Studies Electives.

Mechanical Engineering
Bachelor of Engineering (21.0 credits)

First Year

1. 4.0 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606;
2. 1.0 credit in Complementary Studies Electives.

Second Year

3. 5.0 credits in MATH 2004, MATH 3705, MAAE 2001, MAAE 2101, MAAE 2202, MAAE 2300, MAAE 2400, MAAE 2700, ECOR 2606, ALSS 1000;

Third Year

4. 5.0 credits in STAT 3502, MAAE 3004, MAAE 3202, MAAE 3300, MAAE 3400, MAAE 3901, MECH 3002, MECH 3700, SYSC 3600, ELEC 3605;

Fourth Year

5. 4.0 credits in MAAE 4500, MAAE 4102, MAAE 4905, MECH 4003, MECH 4406, MECH 4907 [1.0], ECOR 3800;
6. 2.0 credits from Mechanical and Aerospace (MECH, AERO, MAAE) at the 4000-level, ELEC 4504.

Mechanical Engineering with Concentration in Computer Integrated Manufacturing
Bachelor of Engineering (21.0 credits)

First Year

1. 4.0 credits in CHEM 1101, MATH 1004, MATH 1005, MATH 1104, PHYS 1004, ECOR 1010, ECOR 1101, ECOR 1606;
2. 1.0 credit in Complementary Studies Electives;

Second Year

3. 5.0 credits in MATH 2004, MATH 3705, MAAE 2001, MAAE 2101, MAAE 2202, MAAE 2300, MAAE 2400, MAAE 2700, ECOR 2606, ALSS 1000;

Third Year

4. 4.5 credits in STAT 3502, MAAE 3004, MAAE 3202, MAAE 3300, MAAE 3901, MECH 3002, MECH 3700, SYSC 3600, ELEC 3605;
5. 0.5 credit in either BUSI 1001 or BUSI 2101;

Fourth Year

6. 4.0 credits in MAAE 4500, MAAE 4102, MAAE 4905, MECH 4003, MECH 4406, MECH 4907 [1.0], ECOR 3800;
7. 1.5 credits from AERO 4304, MECH 4501, MECH 4503, MECH 4604, MECH 4704, MECH 4705;
8. 0.5 credit in Mechanical and Aerospace (MECH, AERO, MAAE) at the 4000-level or ELEC 4504.

Software Engineering
Bachelor of Engineering (21.0 credits)

First Year

1. 5.0 credits in ALSS 1000, MATH 1004, MATH 1005, MATH 1104, PHYS 1003, PHYS 1004, ECOR 1010, SYSC 1100, SYSC 1101, SYSC 1102;

Second Year

2. 5.0 credits in CHEM 1101, MATH 2004, MATH 1805, ECOR 1101, SYSC 2001, SYSC 2003, SYSC 2100, SYSC 2101, ELEC 2501, ELEC 2607;

Third Year

3. 5.0 credits in COMP 3005, ECOR 3800, SYSC 3001, SYSC 3100, SYSC 3101, SYSC 3303, SYSC 4800, SYSC 4005, STAT 3502, SYSC 3600;

Fourth Year

4. 4.0 credits in SYSC 3905, SYSC 4101, SYSC 4507, SYSC 4106, SYSC 4806, SYSC 4905 [1.0], ELEC 4705;
5. 0.5 credit from ELEC 2507, SYSC 3200, SYSC 3501, SYSC 3502, SYSC 3601, SYSC 4102, SYSC 4105, SYSC 4107, SYSC 4405, SYSC 4504, SYSC 4505, SYSC 4602, ELEC 4708, ELEC 4509, ELEC 4506;
6. 0.5 credit from the list in Item 6 or in Approved Science and Computer Science Electives;
7. 1.0 credit in Complementary Studies Electives.