



School of Civil Engineering (SCE)
Faculty of Engineering



Bachelor of Engineering (Civil)

ADMINISTRATION TEAM



| Position | Name |
|--|---|
| Chair | Prof. Dr. Khairul Anuar Kassim kanuar@utm.my 07-553 1500 |
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BACHELOR OF ENGINEERING (CIVIL) PROGRAMME SPECIFICATIONS

The Bachelor of Engineering (Civil) is offered either on a full-time or part-time basis. The full-time programme is offered only at the UTM Main Campus in Johor Bahru while the part-time programme is offered at various learning centres throughout Malaysia. The duration of study for the full-time programme is subjected to the student's entry qualifications and lasts between four (4) years to a maximum of six (6) years.

The programme is offered on full-time basis and is based on a 2-Semester per academic session. Generally, students are expected to undertake courses equivalent to between fifteen (15) to eighteen (18) credit hours per semester. Assessment is based on coursework's and final examinations given throughout the semester.

General Information

| 1. Awarding Institution | | Universiti Teknologi Malaysia | | |
|---|------------------|------------------------------------|----------------------|-----------|
| 2. Teaching Institution | | Universiti Teknologi Malaysia | | |
| 3. Programme Name | | Bachelor in Civil Engineering | | |
| 4. Final Award | | Bachelor of Engineering (Civil) | | |
| 5. Programme Code | | SEAW | | |
| 6. Professional or Statutory Body of Accreditation | | Kementerian Pendidikan Malaysia | | |
| 7. Language(s) of Instruction | | English and Bahasa Melayu | | |
| 8. Mode of Study (Conventional, distance learning, etc) | | Conventional | | |
| 9. Mode of operation (Franchise, self-govern, etc) | | Self-governing | | |
| 10. Study Scheme (Full Time/Part Time) | | Full Time | | |
| 11. Study Duration | | Minimum : 4 yrs Maximum : 6 yrs | | |
| Type of Semester | No. of Semesters | | No of Weeks/Semester | |
| | Full Time | Part Time | Full Time | Part Time |
| Normal | 8 | - | 14 | - |
| Short | 4 | - | 8 | - |

Course Classification

| No. | Classification | Credit Hours | Percentage |
|------|--|-------------------------|-------------|
| i. | University Courses | | |
| | a. General | 8 | 26.3% |
| | b. Language | 8 | |
| | c. Entrepreneurship | 2 | |
| | d. Co-Curriculum | 3 | |
| | e. Mathematics | 15 | |
| ii. | Faculty/Programme Core | 92 | 67.2% |
| iii. | Programme Electives | 9 | 6.6% |
| | Total | 137 | 100% |
| A | Engineering Courses | | |
| | (a) Lecture/Project/Laboratory | 79 | 70.1% |
| | (b) Workshop/Field/Design Studio | 6 | |
| | (c) Industrial Training | 5 | |
| | (d) Final Year Project | 6 | |
| | Total Credit Hours for Part A | 96 | |
| B | Related Courses | | |
| | (a) Applied Science/Mathematic/Computer | 20 | 29.9% |
| | (b) Management/Law/Humanities/Ethics/Economy | 10 | |
| | (c) Language | 8 | |
| | (d) Co-Curriculum | 3 | |
| | Total Credit Hours for Part B | 41 | |
| | Total Credit Hours for Part A and B | 137 | 100% |
| | Total Credit Hours to Graduate | 137 credit hours | |

Award Requirements

To graduate, students must:

- Attain a total of not less than 137 credit hours with a minimum CGPA of 2.0.

Entry Requirements

The minimum qualifications for candidates who intend to do a Bachelor of Engineering (Civil) are as follows:

- 1) Minimum results based on **the Malaysian High School Certificate (STPM)** (results would be based on the general requirements as well as other conditions as the pre-requisites for the programme set by the university).

General University Requirements:

- i. Passed and obtained good results in the **Malaysian Certificate Examination (SPM)** or its equivalent.
- ii. Passed Bahasa Melayu /Bahasa Malaysia with **credit** in the SPM/equivalent.
- iii. Passed the **Malaysian High School Certificate (STPM)** or its equivalent and obtained the following:
 - a) **Grade C (NGMP 2.00)** General paper, and
 - b) **Grade C (NGMP 2.00)** in two (2) other subjects
- iv. Passed the Malaysian University English Test (MUET) with minimum result of **Band 1**.

Special Requirements for the Programme

- i. Obtained a **CGPA of 2.80**; and Passed with a minimum **Grade B- (NGMP 2.67)** in two of the following subjects:

- a) Mathematics T / Further Mathematics
- b) Physics/ Chemistry/ Biology

(Eligible candidates in **Physics** subjects at Matriculation / Foundation must obtained minimum of **Grade C** in SPM for **Chemistry** subjects.) Or

(Eligible candidates in **Chemistry or Biology** subjects at Matriculation / Foundation must obtained minimum of **Grade C** in

SPM for **Physics** subjects.)

- ii. Passed **Mathematics** and **Physics** in SPM with minimum of **GED C**.
- iii. Passed the **Malaysian University English Test (MUET)** with minimum result of **Band 2**.
- iv. No disabilities which inhibit physical activities.

2) Minimum requirements for Matriculation Certificates (KPM) / Asasi Sains UM / Asasi UiTM (fulfil the general requirements set by the university as well as other conditions of the programme).

General University Requirements

- i. Passed the **Malaysian Certificate Examination (SPM)** / equivalent examination with **GED C** in Bahasa Melayu/Bahasa Malaysia.
- ii. Passed the **Matriculation Certificate Examination KPM/Asasi Sains UM / Asasi UiTM** with a minimum **CGPA of 2.00** and passed all the core subjects.
- iii. Passed the **Malaysian University English Test (MUET)** with minimum result of **Band 1**.

Special Requirements of the Programme:

- i. Obtained a **CGPA of 2.80**; and Passed with a **Grade B- (CGPA 2.67)** in two of the following subjects:
 - a) Mathematics
 - b) Physics/ Engineering Physics / Chemistry / Engineering Chemistry / Biology

(Eligible candidates in **Physics / Engineering Physics** subjects at Matriculation / Foundation must obtained minimum of **Grade C** in SPM for **Chemistry** subjects.) Or

(Eligible candidates in **Chemistry / Engineering Chemistry or Biology** subjects at Matriculation / Foundation must obtained minimum of **Grade C** in SPM for **Physics** subjects.)

- ii. Passed **Mathematics** and **Physics** in SPM with minimum of **GED C**.
- iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 2**.
- iv. No disabilities which inhibit physical activities.

3) Minimum qualifications for students with Certificates/Diplomas

(Fulfill the general requirements set by the university as well as specific requirements of the programme).

General University Requirements

- i. Passed the **Malaysian Certificate Examination (SPM)** / equivalent examination with **credit** in Bahasa Melayu/Bahasa Malaysia.
- ii. Obtained a **Diploma** or **other equivalent** qualification recognized by the **Government of Malaysia** and approved by the **Senate of IPTA**. or

Passed the **Malaysian High School Certificate (STPM)** in year 2016 or earlier with minimum result of:-

- **Grade C (NGMP 2.00)** General paper
- **Grade C (NGMP 2.00)** in two (2) other subjects

- iii. Passed Matriculation examination in year 2015 or earlier with minimum of **CGPA 2.00**.
- iv. Passed the Malaysian University English Test (MUET) with minimum result of **Band 1**.

Special Requirements of the Programme:

- i. Obtained a **Diploma in Civil Engineering from UTM**/equivalent with a minimum **CGPA of 2.70**; or for candidates with a CGPA below 2.70 but have a minimum of **two or more years of working experience** in the related area of study will be eligible to apply for a place to study at the university.
- ii. Obtained a **credit pass in Mathematics** in their SPM/equivalent examination or a minimum **grade C** in any of the Mathematics Courses taken at the diploma level.
- iii. Passed the Malaysian University English Test (MUET) with minimum result of **Band 2**.
- iv. No disabilities which inhibit physical activities.
- v. Candidates are required to submit the results transcript of all their examinations taken during their Diploma study (semester one until the final semester) to UTM. A copy of the diploma or a letter of completion of study will also have to be submitted together with their applications.

Note: - Year of entry and duration of study will be based on the credit exemptions and credit transfer awarded by the university.

Programme Educational Objectives (PEO)

After having exposed to 3 to 5 years working experience, our graduates should become professionals who demonstrate the following competencies:

| Code | Intended Educational Objectives |
|------|--|
| PEO1 | Competent, innovative and entrepreneurial in acquiring and applying knowledge towards solving civil Engineering problems. |
| PEO2 | Possess leadership qualities, able to work, manage in diverse teams and serve the society in multi-disciplinary environment. |
| PEO3 | Professionalism and uphold ethical values with emphasis on sustainable environment. |
| PEO4 | Communicate effectively, possess strong self-confidence and recognize the need for life-long learning. |

Programme Learning Outcomes (PLO)

After having completed the programme, graduates should be able to demonstrate the following competencies:

| Code | Intended Learning Outcomes |
|---|--|
| PLO 1 Engineering Knowledge | Apply knowledge of mathematics, natural science, engineering fundamentals and an engineering specialization as specified in WK1 to WK4 respectively to the solution of complex engineering problems |
| PLO 2 Problem Analysis | Identify, formulate, conduct research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences (WK1 toWK4) |
| PLO 3 Design/Development of Solutions | Design solutions for complex engineering problems and design systems, components or processes that meet specified needs with appropriate consideration for public health and safety, cultural, societal, and environmental considerations (WK5) |
| PLO 4 Investigation | Conduct investigation of complex engineering problems using research-based knowledge (WK8) and research methods including design of experiments, analysis and interpretation of data, and synthesis of information to provide valid conclusions |
| PLO 5 Modern Tools Usage | Create, select and apply appropriate techniques, resources, and modern engineering and IT tools, including prediction and modelling, to complex engineering problems, with an understanding of the limitations (WK6) |
| PLO 6 The Engineering and Society | Apply reasoning informed by contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to professional engineering practice and solutions to complex engineering problems (WK7) |
| PLO 7 Environmental and Sustainability | Understand and evaluate the sustainability and impact of professional engineering work in the solutions of complex engineering problems in societal and environmental contexts. (WK7) |

| | |
|--|---|
| <p>PLO 8 Ethics</p> | <p>Apply ethical principles and commit to professional ethics and responsibilities and norms of engineering practice (WK7)</p> |
| <p>PLO 9 Individual and Team Work</p> | <p>Function effectively as an individual, and as a member or leader in diverse teams and in multi-disciplinary settings</p> |
| <p>PLO 10 Communication</p> | <p>Communicate effectively on complex engineering activities with the engineering community and with society at large, such as being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions</p> |
| <p>PLO 11 Project Management and Finance</p> | <p>Demonstrate knowledge and understanding of engineering management principles and economic decision making and apply these to one's own work, as a member and leader in a team, to manage projects in multidisciplinary environments</p> |
| <p>PLO 12 Life Long Learning</p> | <p>Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change</p> |

Mapping of PLO to UTM Graduate Attribute

| | | UTM Graduate Attribute | | | | | | |
|----------------------------------|------------------------------------|---------------------------|----------------------|------------------|--------------------------|-------------------|---------------------|-------------------------|
| PLO | Description of PLO | Communication Skills (CS) | Thinking Skills (TS) | Scholarship (SC) | Team working Skills (TW) | Adaptability (AD) | Global Citizen (GC) | Enterprising Skill (ES) |
| FKA–UTM Learning Outcomes | | | | | | | | |
| 1 | Engineering Knowledge | | | √ | | | | |
| 2 | Problem Analysis | | √ | | | | | |
| 3 | Design or Development of Solutions | | √ | | | | | |
| 4 | Investigation | | √ | | | | | |
| 5 | Modern Tool Usage | | | √ | | | | |
| 6 | The Engineer and Society | | | | | √ | | |
| 7 | Environment and Sustainability | | | | | | √ | |
| 8 | Ethics | | | | | | √ | |
| 9 | Communication | √ | | | | | | |
| 10 | Individual and Team Work | | | | √ | | | |
| 11 | Project Management and Finance | | | | | | | √ |
| 12 | Life-long Learning | | | √ | | | | |

PROFESSIONAL SKILLS CERTIFICATE (PSC)

Students are given a chance to enroll in certificate programmes offered by the Centre's of Excellence in the University and the School of Professional and Continuing Education (SPACE) during semester breaks

1. How to Get Yourself Employed (HTGYE)
2. ISO 9001: 2008 Quality Management System Requirement (ISO)
3. Occupational Safety, Health & Environment (OSHA)
4. How to Manage Your Personal Finance (HTMYPF)
5. Test of English Communication Skills for Graduating Students (TECS):
 - (i) TECS 1001 (Paper I – Oral Interaction)
 - (ii) TECS 1002 (Paper II - Writing)

CROSS-CAMPUS PROGRAMME

Students are given the opportunity to enroll in a few courses in participating universities. The grades and credits obtained during this period are transferable (up to 1/3 of the total credits of the curriculum). Currently, there are four participating universities i.e. Universiti Teknologi Malaysia, Universiti Sains Malaysia, Universiti Malaya and Universiti Malaysia Sarawak.

The programme is open to undergraduates who have undergone a minimum of two semesters of their studies with the following conditions:

- (i) The total number of credits allowed to be taken is between twelve (12) and sixteen (16) credits only.
- (ii) The student should hold a minimum CGPA of 3.00 at the time of application.
- (iii) The student is not a residence of or originated from the state where the university that he/she intends to attend is located.

The student will not be charged tuition fees by the participating university but shall pay the regular tuition fees at UTM. However should the participating university provide accommodation, the student will need to pay accommodation fees

COURSE MENU

| YEAR 1 : SEMESTER 1 | | | |
|------------------------|---|--------|---------------|
| Code | Course | Credit | Pre-requisite |
| SEAA 1011 | Introduction to Civil Engineering | 1 | |
| SEAA 1213 | Engineering Mechanics | 3 | |
| SEAA 1513 | Fluid Mechanics | 3 | |
| SSCE 1693 | Engineering Mathematics I | 3 | |
| UHMT 1012 | Graduate Success Attributes | 2 | |
| UHLB 1122 | Academic English Skills | 2 | |
| UHMS 1182 | Appreciation of Ethics and Civilizations (For Local Students Only) | 2 | |
| UHS 1022/ UHMS 1182 | Malaysian Studies 3 (For International Students Only) | | |
| UKQ# 2##2 | Co-Curriculum & Service Learning | 2 | |
| TOTAL CREDIT | | 18 | |
| CUMULATIVE CREDITS | | 18 | |

| YEAR 1 : SEMESTER 2 | | | |
|---------------------|---|--------|---------------|
| Code | Course | Credit | Pre-requisite |
| SEAA 1023 | Engineering Surveying | 3 | |
| SEAA 1422 | Engineering Drawing | 2 | |
| SEAA 1713 | Soil Mechanics | 3 | |
| SSCE 1793 | Differential Equations | 3 | |
| SSCE 1993 | Engineering Mathematics II | 3 | |
| UBSS 1032 | Introduction to Entrepreneurship | 2 | |
| UHS 1022 | Philosophy and Current Issues (For Local Students Only) | 2 | |
| UHLM 1012 | Malay Language Communication 2 (For International Students Only) | | |
| TOTAL CREDIT | | 18 | |
| CUMULATIVE CREDITS | | 36 | |

| YEAR 1 : (SHORT SEMESTER) | | | |
|---------------------------|----------------|--------|---------------|
| Code | Course | Credit | Pre-requisite |
| SEAA 1031 | Surveying Camp | 1 | SEAA 1023 |
| TOTAL CREDIT | | 1 | |
| CUMULATIVE CREDITS | | 37 | |

| YEAR 2 : SEMESTER 1 | | | |
|---------------------|-----------------------------------|--------|---------------|
| Code | Course | Credit | Pre-requisite |
| SEAA 2012 | Civil Engineering Laboratory 1 | 2 | |
| SEAA 2032 | Mechanical and Electrical Systems | 2 | |
| SEAA 2513 | Hydraulics | 3 | |
| SEAA 2722 | Geotechnics 1 | 2 | SEAA 1713 |
| SEAA 2832 | Highway Engineering | 2 | SEAA 1713 |
| SEAA 2912 | Water Treatment | 2 | |
| SSCE 2393 | Numerical Methods | 3 | |
| UHLB 2122 | Advanced Academic English Skills | 2 | UHLB1112 |
| TOTAL CREDIT | | 18 | |
| CUMULATIVE CREDITS | | 55 | |

| YEAR 2 : SEMESTER 2 | | | |
|---------------------|--|--------|---------------|
| Code | Course | Credit | Pre-requisite |
| SEAA 2112 | Civil Engineering Materials | 2 | |
| SEAA 2223 | Mechanics of Materials and Structures | 3 | SEAA 1213 |
| SEAA 2413 | Computer Programming | 3 | SEAA 1422 |
| SEAA 2712 | Engineering Geology and Rock Mechanics | 2 | SEAA 1713 |
| SEAA 2922 | Wastewater Engineering | 2 | |
| SSCE 2193 | Engineering Statics | 3 | |
| UHIT 2302 | The Thought of Science and Technology | 2 | |
| TOTAL CREDIT | | 17 | |
| CUMULATIVE CREDITS | | 72 | |

| YEAR 3 : SEMESTER 1 | | | |
|---------------------|--|--------|---------------|
| Code | Course | Credit | Pre-requisite |
| SEAA 3123 | Construction Technology, Contract & Estimating | 3 | |
| SEAA 3243 | Theory of Structures | 3 | SEAA 2223 |
| SEAA 3313 | Reinforced Concrete Design 1 | 3 | SEAA 2223 |
| SEAA 3412 | Building Information Modelling and Data Management | 2 | SEAA 2413 |
| SEAA 3712 | Geotechnics | 2 | SEAA 2722 |
| UHLX 1122 | Elective of Foreign Language | 2 | |
| UKQT 3001 | Extracurricular Experiential Learning (EXCEL) | 1 | |
| TOTAL CREDIT | | 16 | |
| CUMULATIVE CREDITS | | 88 | |

| YEAR 3 : SEMESTER 2 | | | |
|---------------------|----------------------------------|--------|------------------------------------|
| Code | Course | Credit | Pre-requisite |
| SEAA 3012 | Civil Engineering Laboratory 2 | 2 | |
| SEAA 3022 | Integrated Design Project 1 | 2 | All SEAA Year 1 and Year 2 courses |
| SEAA 3323 | Structural Steel & Timber Design | 3 | |
| SEAA 3613 | Hydrology and Water Resources | 3 | SEAA 1513 |
| SEAA 3842 | Traffic Engineering | 2 | |
| SEAA 3913 | Environmental Management | 3 | |
| UHLB 3132 | English for Professional Purpose | 2 | |
| TOTAL CREDIT | | 17 | |
| CUMULATIVE CREDITS | | 105 | |

| YEAR 3 : (SHORT SEMESTER) | | | |
|---------------------------|---------------------|--------|--|
| Code | Course | Credit | Pre-requisite |
| SEAA 3045 | Industrial Training | 5 | All Basic Civil Engineering Core Courses |
| TOTAL CREDIT | | 5 | |
| CUMULATIVE CREDITS | | 110 | |

| YEAR 4 : SEMESTER 1 | | | |
|---------------------|--------------------------------------|--------|---------------|
| Code | Course | Credit | Pre-requisite |
| SEAA 4021 | Civil Engineering Seminar | 1 | |
| SEAA 4022 | Research Methodology and Pre-Project | 2 | |
| SEAA 4032 | Integrated Design Project 2 | 2 | SEAA 3022 |
| SEAA 4333 | Reinforced Concrete Design 2 | 3 | SEAA 3313 |
| SEAA 4##3 | Elective 1 | 3 | |
| SEAA 4##3 | Elective 2 | 3 | |
| TOTAL CREDIT | | 14 | |
| CUMULATIVE CREDITS | | 124 | |

| YEAR 4 : SEMESTER 2 | | | |
|---------------------|------------------------------------|--------|---------------|
| Code | Course | Credit | Pre-requisite |
| SEAA 4034 | Final Year Project | 4 | SEAA 4022 |
| SEAA 4113 | Constructions & Project Management | 3 | |
| SEAA 4223 | Structural Analysis | 3 | SEAA 3243 |
| SEAA 4##3 | Elective 3 | 3 | |
| TOTAL CREDIT | | 13 | |
| CUMULATIVE CREDITS | | 137 | |

| Professional Skills Certificate | |
|---------------------------------|--|
| Code | Course |
| TECS 1001 | Oral Interaction |
| TECS 1002 | Writing |
| GLL 1001 | How to Get Yourself Employed |
| GLL 1029 | ISO 9001:2008 Quality Management System Requirements (ISO) |
| GLL 1040 | Occupational Safety, Health & Environment (OSHA) |
| GLL 1041 | How to Manage Personal Finance |

Subject to change

Notes: - L – Lecture; T – Tutorial; P/S – Practical/Studio; Lab – Laboratory

GRADUATION CHECKLIST

To graduate, students must pass all the stated courses in this checklist. It is the responsibility of the students to ensure that all courses are taken and passed. Students who do not complete any of the course are not allowed to graduate.

| NO. | CODE | COURSE | CREDIT EARNED (JKD) | CREDIT COUNTED (JKK) | TICK (✓) IF PASSED |
|--|-----------|---|---------------------|----------------------|--------------------|
| SCHOOL OF CIVIL ENGINEERING COURSES | | | | | |
| 1 | SEAA 1011 | Introduction to Civil Engineering | 1 | 1 | |
| 2 | SEAA 1023 | Engineering Surveying | 3 | 3 | |
| 3 | SEAA 1031 | Survey Camp (YEAR 1 / SHORT SEMESTER) | 1 | HL | |
| 4 | SEAA 1213 | Engineering Mechanics | 3 | 3 | |
| 5 | SEAA 1422 | Engineering Drawing | 2 | 2 | |
| 6 | SEAA 1513 | Fluid Mechanics | 3 | 3 | |
| 7 | SEAA 1713 | Soil Mechanics | 3 | 3 | |
| 8 | SEAA 2012 | Civil Engineering Laboratory 1 | 2 | 2 | |
| 9 | SEAA 2032 | Mechanical & Electrical Systems | 2 | 2 | |
| 10 | SEAA 2112 | Civil Engineering Materials | 2 | 2 | |
| 11 | SEAA 2223 | Mechanics of Materials and Structures | 3 | 3 | |
| 12 | SEAA 2413 | Computer Programming | 3 | 3 | |
| 13 | SEAA 2513 | Hydraulics | 3 | 3 | |
| 14 | SEAA 2712 | Engineering Geology and Rock Mechanics | 2 | 2 | |
| 15 | SEAA 2722 | Geotechnics 1 | 2 | 2 | |
| 16 | SEAA 2832 | Highway Engineering | 2 | 2 | |
| 17 | SEAA 2912 | Water Treatment | 2 | 2 | |
| 18 | SEAA 2922 | Wastewater Engineering | 2 | 2 | |
| 19 | SEAA 3012 | Civil Engineering Laboratory 2 | 2 | 2 | |
| 20 | SEAA 3022 | Integrated Design Project 1 | 2 | 2 | |
| 21 | SEAA 3045 | Industrial Training (YEAR 3 / SHORT SEMESTER) for 12 weeks / 3 months | 5 | HL | |
| 22 | SEAA 3123 | Construction Technology, Estimating & Contract | 3 | 3 | |
| 23 | SEAA 3243 | Theory of Structures | 3 | 3 | |
| 24 | SEAA 3313 | Reinforced Concrete Design 1 | 3 | 3 | |
| 25 | SEAA 3323 | Structural Steel & Timber Design | 3 | 3 | |
| 26 | SEAA 3412 | Building Information Modelling and Data Management | 2 | 2 | |
| 27 | SEAA 3613 | Hydrology and Water Resources | 3 | 3 | |
| 28 | SEAA 3712 | Geotechnics 2 | 2 | 2 | |
| 29 | SEAA 3842 | Traffic Engineering | 2 | 2 | |
| 30 | SEAA 3913 | Environmental Management | 3 | 3 | |
| 31 | SEAA 4021 | Civil Engineering Seminar | 1 | HL | |
| 32 | SEAA 4022 | Research Methodology and Pre-Project | 2 | 2 | |
| 33 | SEAA 4034 | Final Year Project | 4 | 4 | |

| | | | | | |
|---|-----------|---|------------|------------|--|
| 34 | SEAA 4032 | Integrated Design Project 2 | 2 | 2 | |
| 35 | SEAA 4113 | Construction & Project Management | 3 | 3 | |
| 36 | SEAA 4223 | Structural Analysis | 3 | 3 | |
| 37 | SEAA 4333 | Reinforced Concrete Design 2 | 3 | 3 | |
| 38 | SEAA 4##3 | Elective 1 | 3 | 3 | |
| 39 | SEAA 4##3 | Elective 2 | 3 | 3 | |
| 40 | SEAA 4##3 | Elective 3 | 3 | 3 | |
| TOTAL CREDIT OF CIVIL ENGINEERING COURSES (a) | | | 101 | 94 | |
| MATHEMATICS COURSES (Faculty of Science) | | | | | |
| 1 | SSCE 1693 | Engineering Mathematics I | 3 | 3 | |
| 2 | SSCE 1793 | Differential Equations | 3 | 3 | |
| 3 | SSCE 1993 | Engineering Mathematics II | 3 | 3 | |
| 4 | SSCE 2193 | Engineering Statistics | 3 | 3 | |
| 5 | SSCE 2393 | Numerical Methods | 3 | 3 | |
| TOTAL CREDIT OF MATHEMATICS COURSES (b) | | | 15 | 15 | |
| UNIVERSITY GENERAL COURSES | | | | | |
| Kluster 1: Penghayatan Falsafah, Nilai & Sejarah (Faculty of Social Sciences and Humanities) | | | | | |
| 1 | UHMS1182 | Penghayatan Etika dan Peradaban (for Local Students Only) | 4 | 4 | |
| | UHS1022 | Falsafah dan Isu Semasa (for Local Students only) | | | |
| 2 | UHS1022 | Falsafah dan Isu Semasa <i>(for International Students Only)</i> | 4 | 4 | |
| | @ | @ | | | |
| | UHMS1182 | Penghayatan Etika dan Peradaban <i>(for International Students Only)</i> | | | |
| | ULAM 1012 | Malay Language Communication 2 (for International Students Only) | | | |
| Kluster 2: Kemahiran Insaniah (Soft Skills) | | | | | |
| 1 | UHMT1012 | Graduate Success Attributes | 2 | 2 | |
| 2 | UBSS 1032 | Introduction to Entrepreneurship | 2 | 2 | |
| Kluster 3: Perluasan Ilmu | | | | | |
| 1 | UHIT 2302 | The Thought of Science and Technology | 2 | 2 | |
| Kluster 4: Kurikulum Pembelajaran Servis | | | | | |
| 1 | UKQ# 2##2 | Co-Curriculum & Service Learning | 2 | 2 | |
| 2 | UKQE 3001 | Extracurricular Experiential Learning (EXCEL) | 1 | 1 | |
| Kluster 5: Kemahiran Bahasa (Language Skill) (Language Academy, Faculty of Social Sciences and Humanities) | | | | | |
| 1 | UHLB 1122 | Academic English Skills | 2 | 2 | |
| 2 | UHLB 2122 | Advanced Academic English Skills | 2 | 2 | |
| 3 | UHLB 3132 | English for Professional Purposes | 2 | 2 | |
| 4 | ULAX 1122 | Elective Of Foreign Language | 2 | 2 | |
| TOTAL CREDIT of UNIVERSITY GENERAL COURSES (c) | | | 21 | 21 | |
| TOTAL CREDIT TO GRADUATE (a + b + c) | | | 137 | 130 | |
| OTHER COMPULSORY COURSES | | | | | |
| Professional Skills Certificate (PSC) (UTMSPACE/ School) | | | | | |
| 1 | GLL 1001 | How to Get Your Self Employed | | | |
| 2 | GLL 1029 | ISO 9001:2008 Quality Management System Requirement | | | |
| 3 | GLL 1040 | Occupational Safety, Health and Environment | | | |
| 4 | GLL 1041 | How to Manage Your Personal Finance | | | |

| Test of English Communication Skill (TECS) (Language Academy, Faculty of Social Sciences and Humanities) | | |
|---|-----------|------------------|
| 1 | TECS 1001 | Oral Interaction |
| 2 | TECS 1002 | Writing |

Elective Courses

1. Materials, Management and Construction

SEAA 4133 Construction Laws and Contract
 SEAA 4143 Construction Plants and Equipment
 SEAA 4153 Offshore Structures
 SEAA 4163 Concrete Technology

2. Structural Analysis and Design

SEAA 4203 Stability and Dynamics of Structures
 SEAA 4243 Finite Element Method
 SEAA 4263 Earthquake and Wind Engineering
 SEAA 4273 Maintenance of Seismic Structures and Materials
 SEAA 4293 Advanced Solid Mechanics
 SEAA 4313 Advanced Reinforced Concrete Design
 SEAA 4323 Prestressed Concrete Design
 SEAA 4383 Analysis and Design of Tall Building Systems

3. Information Technology

SEAA 4433 Advanced Computer Programming
 SEAA 4463 Construction Integration Environment
 SEAA 4473 Geographic Information System

4. Hydraulics and Hydrology

SEAA 4523 Coastal Engineering
 SEAA 4613 Water Resources Management
 SEAA 4623 Urban Stormwater Management
 SEAA 4633 Groundwater Hydrology

5. Geotechnics and Transportation

SEAA 4713 Geotechnical Analysis and Design
 SEAA 4723 Engineering Rock Mechanics
 SEAA 4733 Advanced Foundation Engineering
 SEAA 4813 Pavement Design and Construction
 SEAA 4823 Transportation Planning

6. Environmental Engineering

SEAA 4923 Advanced Water and Wastewater Treatment
 SEAA 4943 Solid Waste Management
 SEAA 4973 Industrial and Hazardous Waste Treatment
 SEAA 4983 Water Quality Management

COURSE SYNOPSIS

CORE COURSES

First Year

SEAA 1011 Introduction to Civil Engineering

This course is only offered in the 1st Semester to all new students of Faculty of Civil Engineering. The course includes a general introduction to the field of civil engineering and the engineer's responsibilities to society. Main subfields in the discipline such as Structural Engineering, Transportation and Geotechnical Engineering, Hydraulics and Hydrology and Environmental Engineering will be highlighted by experts of the respective subfields. The course also exposes the students to generic skills related to engineering practices such as team working, making ethical decisions and communication skills through the lectures and group projects. Prior to the weekly lectures and presentations, a special welcoming lecture will be given by the Dean of Faculty.

SEAA 1023 Engineering Surveying

This course provides the basic theory and practice of surveying to civil engineering students. Methods of establishing horizontal & vertical control for construction and design are explained, compared and practiced via fieldworks. Since accuracy of survey work is vital in ensuring designs are exactly positioned, students must be able to analyse errors so that standard accuracies are met. Detailing for producing site plans, area and volume estimations, road curves geometric design are also discussed. The concept of field survey automation and the usage of software are explained. At the end of the course, students are expected to be able to plan, execute, compute and analyse surveying works involved in establishing horizontal & vertical controls and producing plans for civil engineering applications. Students should also be able to geometrically design horizontal and vertical curves according to standards, perform area calculations and volume estimation for earthwork activities in civil engineering.

SEAA 1031 Surveying Camp

Pre-requisite: SEAA 1023 Engineering Surveying

After successfully completing course SKAA 1023, students are well exposed to the theory and practice of surveying. Nevertheless, surveying projects that were undertaken so far are 'stand-alone' projects with emphasis on the understanding of the concepts involved. Therefore, this subject provides

training of the surveying work involved in a typical civil engineering project. In other words, this subject gives a holistic view of the surveying activities needed prior to and during the construction stage of a civil engineering project. The course will furthermore, train students in planning and executing survey works on a larger scale. The surveying works involved depend on the type of project undertaken, but normally include establishing horizontal and vertical controls, detailing, earthwork calculations and setting out. Students are assessed based on their oral presentation and written reports submitted at the end of the course. This subject introduces the basics and concepts of surveying in general with emphasis towards engineering surveying. Basic surveying needs commonly required in civil engineering are explained. Methods of establishing horizontal & vertical controls, detailing for producing site plans, area and volume estimations, road curves geometric design and setting out are discussed. Students are introduced to the typical field tasks as required in civil engineering. Common methods of field procedures, bookings and reduction of observations are adopted.

Students are expected to be able to establish horizontal and vertical controls, setting out and detailing. The importance of surveying field activities prior to the design and during the construction stages in civil engineering work is highlighted. Since accuracy of survey work is vital in ensuring designs are exactly positioned, students must be able to conduct survey works that meet standard accuracies.

SEAA 1213 Engineering Mechanics

The course is designed to expose the students to the basic principles of statics and dynamics. The subject is divided into two parts: Mechanics of Statics and Mechanics of Dynamics. The content of the lecture will be emphasized on the application of the basic mechanics principle in civil engineering. Mechanics of Statics deals with equilibrium of bodies, i.e. bodies at rest and bodies moving with a constant velocity. It includes resultant and resolution of forces, equilibrium of a particle, force system resultant, equilibrium of rigid bodies, center of gravity and centroid, and moment of inertia of an area. Mechanics of Dynamics deals with the accelerated motion of bodies. It includes kinematics and kinetics of a particle and of a rigid body. Kinematics discusses the relationship between displacement, velocity and acceleration against time. Kinetics covers the concepts of force and acceleration (Newton's second law of motion), energy and work, impulse and momentum, and vibration. At the end the course,

students should be able to incorporate and utilize principles of applied mechanics in civil and structural engineering problems.

SEAA 1422 Engineering Drawing

This course is designed to expose the students to the basic understanding of technical and engineering drawings. It will cover the aspect of understanding and interpretation of the element of drawings. The concept of orthographic and isometric projection will be discussed and applied in the hands-on session with Computer Aided Drawing (CAD). Students will also be exposed to the civil works drawings, i.e. the earthworks, reinforced concrete detailing and structural steel detailing drawings. Several exercises are performed with the use of CAD to get the students acquaintance of the software. During this session, students will be asked to draw and submit group projects that are given to them. After completing this course students should be able to produce civil engineering drawings using CAD

SEAA 1513 Fluid Mechanics

This course is designed to introduce and apply the concepts of Fluid Mechanics (fluid statics and kinematics, forces and flow in closed conduits, pipe networks and centrifugal pumps) and to solve problems related to Civil Engineering. It encompasses topics such as fluid statics and fluid dynamics. The pressures and forces in these static and dynamic fluids are introduced, discussed and analysed through equations. It also covers upon the analyses of flows in closed conduits to include minor and major head losses. The performance characteristics, functions and applications of centrifugal pumps in pipeline systems are also demonstrated and analysed in this course.

SEAA 1713 Soil Mechanics

This subject is a compulsory subject for civil engineering students. The content of this subject will give a student basic understanding and exposure towards practical in Geotechnical Engineering. It will cover on basic soil properties which, consists of soil composition, soil classification and soil compaction. Besides that, it will also discuss on vertical stresses in soil due to overburden and external loading, water in soil and soil shear strength. The topic that will cover is important to civil engineers where most of problems occur at site will involve with geotechnical and soil mechanics. At the end of this subject, students will able to apply the knowledge on basic soil properties, soil classification and compaction properties, water in soil and shear strength parameters in the planning, analysis, design and supervision of related geotechnical works.

Second Year

SEAA 2012 Civil Engineering Laboratory 1

Civil engineering is a practical field and the laboratory work is essential to be performed by students in this field. The laboratory work, which consists of workshops and experiments are designed to expose students essential problem solving and experimental techniques. Most of the generic attributes that the students must develop at the University are acquired through the laboratory experiments and researches.

Laboratory sessions are able to strengthen the students to relate the fundamental theories with laboratory experiments in the field of concrete, transportation, hydraulics, and structural engineering.

Each student will experiences data collections and performs data analysis and result interpretations. Application of the experimental results to the real civil engineering problem will be highlighted.

Upon completion of the course, students are expected to be able to perform laboratory experimental work and investigation in concrete, transportation, hydraulics and structural engineering, to develop the techniques of conducting measurements, data analysis and interpret results in written report, and to develop generic attributes and enhance their ability to participate effectively in a laboratory environment and be able to work as part of a team.

SEAA 2032 Mechanical and Electrical Systems

This course is a service course from the Faculty of Mechanical Engineering & the Faculty of Electrical Engineering. The course will exposed civil engineering students to the fundamentals of Mechanical & Electrical building services. The topics to be covered in the Mechanical Portions are design of Domestic Water Supply System, Fire Prevention System, Ventilation and Air-Conditioning System and Lift and Escalators System. Students will be exposed more on design using professional charts and codes and catalogues from manufacturers.

The electrical portion of the course covers single phase and three phase system followed by an insight to transformer and induction motor operation. The electrical section will also cover the commercial practice of electrical wiring and substation design. At the end of the course, students should be

able to demonstrate the understanding of electrical system and machines operation and ability to design domestic wiring system.

SEAA 2112 Civil Engineering Materials

This course is designed for students to understand the different types of construction materials used in civil engineering. It will emphasize on types, properties, and function of cement, aggregates, water, admixtures in concrete; properties of fresh and hardened concrete, concrete mix design method, manufacturing concrete on site; test of hardened concrete; timber - properties, characteristics, manufacturing, and applications, masonry - types and characteristics of brick and block, mortar in masonry work, ferrous and non-ferrous metal, and other latest materials in construction industry. At the end of the course students should be able to describe, identify and discuss the properties and behavior of different types of civil engineering materials together with the selection of the right materials for applications in practice.

SEAA 2223 Mechanics of Materials and Structures

Pre-requisite: SEAA 1213 Engineering Mechanics

This is a core subject. Students will be able to understand the basic theory of the fundamental principles of mechanics of materials. Students will be able to incorporate these basic fundamentals into application of the basic design of simple structures. It will assure them of the concepts of stress and strain, plane-stress transformation, shear force and bending moment, stresses in beams, and deflections of beams, vibration of beams, columns, and torsion. At the end of the course, the students should be able to solve numerous problems that depict realistic situations encountered in engineering practice. The students will also be able to develop and master the skills of reducing any such problem from its physical description to a model or symbolic representation to which the principles may be applied.

SEAA 2413 Computer Programming

This course is designed to expose the students on the development of programming skill using a computer language, which is suitable for the current computer operating system. It will emphasize on the general concept of computer programming that includes steps of problem solving using computer, algorithm and program logic tools, interface design, modularization, arrays, files and graphics.

Examples, assignments and group projects related to various civil engineering fields are given to the students. At the end of the course, the student should be able to plan, analyze, and write computer programs for

basic civil engineering applications.

SEAA 2513 Hydraulics

Hydraulics is one of the major disciplines of civil engineering. This course introduces the concepts of open channel fluid flow and their applications in hydraulics engineering problems. It covers various aspects of open channel hydraulics including types of open channel flow, design of channel section dimensions, uniform and non-uniform steady flows. Dimensional analysis and the principle of hydraulic similitude in physical modelling are also included. At the end of the course, students should be able to apply the knowledge in solving civil engineering hydraulics problems.

SEAA 2712 Engineering Geology and Rock Mechanics

Pre-requisite: SEAA 1713 Soils Mechanics

This course is designed to enable students to evaluate, to apply and to analyze the relevant geological and rock mechanics principles in designing safe and economical rock engineering structures. In geology, the related topics on rock types/classifications, geological structures and geological processes are taught. Having acquired this knowledge, the principles of rock mechanics are then introduced mainly to highlight the relevancy of engineering properties of geological materials in designing rock engineering projects. These principles include engineering properties of rock material, rock discontinuities and rock stabilization systems. At the end of the course, students should acquire the related knowledge and principles in geology and rock mechanics, and should be able to apply these knowledge and principles in designing safe and economic engineering structures in rock masses.

SEAA 2722 Geotechnics I

Pre-requisite: SEAA 1713 Soil Mechanics

This course is one of the core courses, which provides solid background knowledge on the properties and behavior of soils for geotechnical engineering practice. Understanding of the course will help the students in designing civil and geotechnical engineering structures. Topics for the course are stresses in soils, compressibility and consolidation of soils, and slope stability. At the end of the course, students should be able to analyze and apply the related theories of soil behavior, and to solve problems of stresses on retaining structures, consolidation settlement and slope stability.

SEAA 2832 Highway Engineering**Pre-requisite: SEAA 1713 Soil Mechanics**

This is one of the compulsory courses which will expose students to the fundamental theory of highway engineering. Topics covered are highway materials and evaluations, premix plants, construction techniques and plants, mix designs, quality controls and testing, pavement structural thickness design, highway drainage, pavement visual assessment, maintenance and rehabilitation.

SEAA 2912 Water Treatment

This course is designed to expose the students to water treatment technology. Topics discussed include basic water quality requirement, water characteristics, water treatment process and supply, and design of unit water treatment systems. For design of water treatment system, it will cover the design of unit treatment operation. Other than treatment methods, the course also discuss on the water distribution.

SEAA 2922 Wastewater Engineering

The course is designed to expose the students to wastewater treatment technology. The course will emphasize on basic environmental microbiology, characteristics of wastewater, wastewater analysis, design of conventional wastewater treatment systems and sludge treatment. For design of wastewater treatment systems, it will cover the design of clarifier, waste stabilization pond, conventional activated sludge, extended aeration, sequential batch reactor, aerated lagoon and trickling filters. The course also covers the sewage quality standards under Environmental Quality Act 1974. The course exposes students to select the suitable wastewater treatment systems for certain application. At the end of the course, the students should be able to apply the knowledge to design a simple unit operation of wastewater treatment systems and also to modify existing unit operation.

Third Year

SEAA 3012 Civil Engineering Laboratory 2

Civil engineering is a practical field and the laboratory work is essential to be performed by students in this field. The laboratory work, which consists of workshops and experiments are designed to expose students essential problem solving and experimental techniques. Most of the generic attributes that the students must develop at the University are acquired through the laboratory experiments and researches. Laboratory sessions are able to strengthen the students to relate the fundamental theories with laboratory experiments in the field of concrete, transportation, hydraulics, and structural engineering. Each student will experiences data collections and performs data analysis and result interpretations. Application of the experimental results to the real civil engineering problem will be highlighted. Upon completion of the course, students are expected to be able to perform laboratory experimental work related to civil engineering such as; concrete, transportation, hydraulics, environmental, geotechnical and structural engineering, to develop the techniques of conducting measurements, data analysis and interpret results in written report, and to develop generic attributes and enhance their ability to participate effectively in a laboratory environment and be able to work as part of a team.

SEAA 3022 Integrated Design Project 1

Pre-requisite: All SEAA 1### and SEAA 2### courses

Integrated Design Project 1 is tailored to encourage students to explore the inception and conceptual planning stage of a civil engineering development project. The subject focuses on site and utility planning of a development project given to students, working in groups. Such exercise may include developing a survey plan.

For the specific proposed site, developing a general drainage and sewerage plan including evaluation of and connection to existing infrastructure and possible need for sewage lift station, proposing location and type of soil investigation to be carried out, producing preliminary road and utility cross sections and recommending any improvements to ease traffic congestion, developing an environmental mitigation plan including sittings of detention ponds and wetlands, to consider alternatives for sustainable design, evaluate the impact of relocating existing utility services and producing a preliminary project design schedule showing milestones and critical path.

The scope and brief of the proposed development will be as reflective of a

real life development project. Students are required to integrate their knowledge of civil engineering disciplines such as (but not limited to) geotechnical engineering, highway and transportation, waste water engineering, and sustainable development considerations into their overall project work. At the end of this course, the students will be able to comprehend the importance of proposing a viable and workable development project and appreciate the importance of integration and synthesis of various discipline of civil engineering knowledge.

SEAA 3045 Industrial Training

Pre-requisite: All Basic Civil Engineering Core Courses

Industrial Training is a core course which will assign students to work with industries for a period of 12 weeks. The training aims to exposed students to real civil engineering practices such as project planning and design, construction management and site supervision and other fields of specialization. Students will gain knowledge and working experience as well as improving their interpersonal skills through working with professionals from the industries. Depending on the nature of work, the students will have opportunity to apply theories learnt in the lecture room into real civil engineering practices.

SEAA 3123 Construction Technology, Estimating & Contract

This is a compulsory course. This course emphasizes on the principles of construction in building and civil engineering works, which consists of site preparation and layout, earthwork activities, construction of various building elements such as foundations, floors, walls and roofs. It also covers other important aspects in construction i.e formworks and scaffoldings. General concepts on industrialized building systems including precast, prestressed and modular coordination in construction are also introduced.

The syllabus also covers the introduction to the methods of estimating and the preparation of the Bills of Quantities and project estimating. At the end of the course, the students should be able to describe and distinguish the various building elements, techniques and systems used in a construction and also to be able to estimate the cost of the building elements. The students should also be able to demonstrate capability of working in a team and some acquirement of contemporary knowledge

SEAA 3243 Theory of Structures

Pre-requisite: SEAA 2223 Mechanics of Materials

This course introduces students to the analysis of determinate and

indeterminate structures in civil engineering. The course emphasizes on the analysis of beams and frame structures subjected to various load conditions by using classical techniques. The course is limited to the linear elastic analysis of beam and frame structures except in plastic analysis where the critical loads at failure are being examined. Students will also be taught on the use of influence diagrams to solve problems involving determinate beams subjected to moving loads. At the end of the course, students should be able to apply the knowledge and use the classical techniques for solving problems in structural engineering

SEAA 3313 Reinforced Concrete Design I

Pre-requisite: SEAA 2223 Mechanics of Materials

This is a core course which will provide an understanding and ability to analyze and design reinforced concrete structural elements. Among the topics discussed are reinforced concrete as a sustainable construction materials, objective and methods of design, code of practice, analysis and design of sections for moments and shear, checking for deflection and cracking, durability and detailing requirements, design of simply supported and continuous beams, design of one way and two way restrained and simply supported slab. Furthermore the students will be exposed to the concept of prestressed concrete which covers topics on principle and methods of prestressing, stress limit, losses and selection of section.

SEAA 3323 Structural Steel & Timber Design

This is a core subject. Students will able to incorporate and utilize technology in the analysis and design of steel and timber structures It will expose the students to the analysis and design of steel and timber structural elements. For the steel design, the topics covered include the advantages and the general concepts of steel constructions, analysis and design of restrained and unrestrained beams, columns with axial load, columns with axial load and bending moment, trusses, bolt and weld connections. For timber structures, the topics covered include the design of beams and columns

SEAA 3412 Building Information Modelling and Data Management

Pre-requisite: SEAA 1422 Engineering Drawing

This course is designed to introduce the concept and principles of Building Information Modelling (BIM), the utilization of BIM technology in the

architecture, engineering and construction (AEC) industry, and future trends of BIM developments. BIM is not only a technology that is dramatically changing the way AEC projects are delivered today, but also involves more integrated processes and parties (considering clients, designers and planners, owners and other stakeholders throughout the project life cycle). This course is also designed to expose the students in analysing, designing and developing the huge of data. It concerns on the management of information and how to model it in a structured manner. The used of database system as an application tool give the student a further step in order to apply an IT application in solving their problems. This course also exposes the knowledge on the usage, management and sharing of data and information to ensure that information is manipulated and used effectively. The aim of the course is to give students a practical, hands-on introduction to BIM and data management techniques for the documentation and modelling of designed structures. At the end of the course, students should be able to plan, analyze, and modelling the data to develop the BIM model and data management related to civil engineering problems.

SEAA 3613 Hydrology and Water Recourses

Pre-requisite: SEAA 1513 Fluid Mechanics

The course emphasizes hydrology and its application in the field of engineering especially those related to water resources. Interdisciplinary aspects of hydrology that will be introduced and discussed are the understanding of the hydrological processes. These processes are precipitation, evaporation, transpiration, surface runoff, groundwater flow, infiltration and interception. Some processes will be discussed in more detail as compared to the others.

An introduction to flood estimation will be highlighted together with the basic analysis and concept design in accordance to local guideline of Urban Storm water Management Manual for Malaysia (MASMA). Frequency analysis will be discussed in this subject. A brief introduction to the hydrologic modeling processes will be introduced as a basic requirement to the understanding to the empirical and numerical modeling concepts.

Upon completion of the course, students are expected to be able to describe and assess all the physical processes found in the hydrologic cycle together with the basic quantitative hydrologic analysis methods.

SEAA 3712 Geotechnics 2

Pre-requisite: SEAA 2722 Geotechnics 1

This course will provide students with sound knowledge on site investigation and foundation designs for civil and geotechnical engineering structures. The main topics of the course are site investigations, shallow foundations and pile foundations. The importance of site investigation for safe and economic foundation designs will be emphasized. Methods, procedures and planning of effective site investigation will be addressed. The topic of shallow foundation will be based on Terzaghi's theory and Meyerhof's general bearing capacity equation, which will include the effects of ground water and eccentric load. Static formulae (Meyerhof' method, α and β methods) and dynamics formula will be introduced to determine single pile capacity in different soil conditions. Capacity and efficiency of pile group in different soils will be addressed.

SEAA 3842 Traffic Engineering

This is one of the compulsory courses which will expose students to the fundamental theory of traffic engineering. The main content of the course provides students with the fundamental theory of traffic flow and management. Major topics include drivers' behavior and interactions, fundamental theory of speed-flow-density relationships and applications in road performance analysis, traffic studies, design of traffic signal control system, and highway geometric design.

SEAA 3913 Environmental Management

The course is designed to expose the students to various aspects in environmental pollution and concepts of environmental management. The course will emphasize on discussion in different aspects of environmental component including water, air, soil and waste management. The important and impacts on type of energy usage towards the environment will also be covered in this course. Various pollution control and prevention methods, environmental regulations as well as the implementation and concept in the environmental impact assessment (EIA) in achieving sustainable development will also be among the important aspect of this course. Upon completion, students should be able to demonstrate and apply the knowledge by the ability to identify specific pollution control technology and methods and the processes in preparing an environmental impact assessment (EIA) report. The students should be able to synthesize the knowledge in a group project and demonstrate a cooperative effort while working in a team as well as develop good relationship and interaction with colleagues and work effectively with other people to achieve mutual objective.

Fourth Year**SEAA 4021 Civil Engineering Seminar**

This course is designed as a compulsory attending course, which is carried out based on a seminar format. Speakers from universities and from within

the practicing civil engineering-based organizations will be invited to talk on specialized topics and issues in various civil engineering field including safety and health. At the end of the course, student should be able to understand the actual civil engineer practices in civil-engineering based activities, and adhere to professional ethics.

SEAA 4022 Research Methodology and Pre-Project

This course is a compulsory course for all students before they undergo the Final Year Project. In this course, the student will be exposed in various aspect of research including types of research, method of literature review, research design, results and analysis, writing of thesis and journal and also presentation skills. The students will also be exposed to the problem solving methodology, decision-making and data collection process. This helps to prepare the students for Final Year Project. The student has to prepare a Pre-Project proposal report in the topic that will be given by their supervisors. At the end of this course, students should be able to understand all aspects of research, conduct research in a systematic way, solve and analyze data and results and write and present pre-project proposal report.

SEAA 4032 Integrated Design Project 2

Pre-requisite: SEAA 3022 Integrated Design Project 1

Integrated Design Project 2 (IDP 2) is tailored to expose and familiarize students to a feasibility study and preliminary design of a civil engineering development project that has been developed previously in Integrated Design Project 1 (IDP 1) (conceptual planning stage). The aim of the Feasibility Study phase is to determine the optimum scheme from a technical, economic, environmental, and construction view.

A Feasibility Study Report is the minimum expected output of this phase. The Feasibility Report shall encompass all the engineering attributes developed in the Planning Stage (IDP 1) and shall propose several options. Each option shall then be investigated to measure its capability to sufficiently address the project constraint aspects and the optimum scheme determined. The chosen scheme will then be developed to the stage of producing a Detailed Design Brief to be adopted at the final Integrated Design Project phase (SKAA 4042). Such exercise shall in part maintain the continuity of the IDP project series.

At the end of this course, the students will be able to comprehend the importance of reviewing and selecting a feasible technical proposal and

appreciate the importance of integration and synthesis of various discipline of civil engineering knowledge.

SEAA 4034 Final Year Project

Pre-requisite: SEAA 4022 Research Methodology and Pre-Project

This course is compulsory for all students before they can get their Bachelor Degree. In this course, the student is expected to be able to conduct research activity independently with supervision from their supervisor.

The students are also required to write a good thesis report and be able to present their project findings effectively. At the end of the course, students should be able to conduct research in a systematic way, collect data relating to the project, solve and analyze data to obtain results, write a good project report and present project findings.

SEAA 4113 Construction and Project Management

This course aims to develop understanding on the importance of construction management principles and its related tools. The course starts with understanding the general perspective of management issues and processes and their relationship to construction. The construction project life cycle together with the roles and responsibilities of professionals involved at each stage will be discussed. The Knowledge, Skills, Roles and Ethical responsibilities of a project manager will be explained. The second part of the course will include the usage of tools available in construction management particularly in the application of planning and scheduling technique using Gantt chart and networking technique. The course will also expose the students to the application of popular scheduling software. The third part of the course is dedicated to the application of scheduling technique related to resource management, resource allocation and project time cost trade-off. The last important topic involves analyzing the project cash flow requirements, project monitoring and control. New Academia Learning Innovation (NALI) such as case study teaching will also be implemented.

SEAA 4223 Structural Analysis

Pre-requisite: SEAA 3243 Theory of Structures

This course is designed to expose the students in analysing the two-dimensional structures using a matrix operational method and computer applications. The matrix operational method is also suitable to be programmed in computers as the solutions adopt the matrix concept. The

course consists of the flexibility method, the stiffness method, concept for solving matrices, an introduction to finite element method and also structural modelling using existing software. The structures include beams, trusses and frames. At the end of the course, students should be able to analyse the structures by using the numerical methods and/or the existing computer software. The students should also have a problem solving skill on problems of interest in Civil Engineering structures.

SEAA 4333 Reinforced Concrete Design 2

Pre-requisite: SEAA 3313 Reinforced Concrete Design 1

This course is a core course which will exposed students to a wider scope of reinforced concrete design. As a continuation to the Reinforced Concrete Design 1, the topics to be covered are design of staircase, design of column, design of footing and pile cap and design of retaining walls. Furthermore the students will exposed to the method of analysis of reinforced concrete frame.

Synopsis of Faculty's Elective Courses

SEAA 4133 Construction Laws and Contract

This course introduces students to Malaysia laws, which will focus on the sources, and branches of law in Malaysia. The course will emphasize on private laws related to construction practice, torts, law of contract and

construction contract administration. Students will be exposed to construction contract administration which covers the Standard Forms of Contract, disputes in construction and dispute resolutions. At the end of the course, students should possess a sound knowledge of the Malaysian legal framework and familiar with legislative and legal constraints applicable to the practice of construction. More importantly, the students should be able to use their knowledge to promote ethical and better image of the construction industry.

SEAA 4143 Construction Plants and Equipment

This course introduces the techniques of applying engineering fundamentals and analyses to the planning, selection and utilization of construction equipment. In general, the right selection, efficient utilization and cost-effectiveness of major construction operations have significant impacts on the overall cost and duration of construction activities. This course uses concepts from various engineering disciplines such as Engineering Economics, Geotechnical, Mechanical, Structural and Environmental Engineering, among others. At the end of this course, the students should be able to apply engineering fundamentals and analyses to the planning, selection and utilization of construction equipment. This includes a thorough understanding on the total construction process and how construction equipment should be selected and used to produce the intended quality in the most cost-effective manner.

SEAA 4153 Offshore Structures

Pre-requisite: SEAA 3243 Theory of Structures

SEAA 3352 Reinforced Concrete Design 1

SEAA 3323 Structural Steel & Timber Design

This course emphasizes on the overview of offshore structural engineering related to oil and gas industry by covering vast amount of fundamental topics such as Front-end engineering design (FEED), Environmental loads, Response of Structures to environmental loading, Analysis and Design of Offshore Steel platforms, Analysis and Design of Offshore Topside Modules, Construction of Steel Platforms, Load-out, installation, hook-up and commissioning of offshore structures, Inspection, repair and Maintenance, Structural assessment of existing structures as well as removal of disused structures.

SEAA 4163 Concrete Technology

This course is designed to introduce students and enhance their knowledge on concrete technology. It will emphasize on the rheology of fresh concrete,

the various design of concrete mixes, the different types and properties of cement replacement materials, special concretes which include fiber reinforced concrete, high strength concrete, lightweight aggregate concrete, and polymer concrete. Other topics that will be covered include concrete deformations, durability of concrete, and repair of concrete structures due to various causes of deterioration. At the end of the course students should be able to identify, discuss and apply the materials and technology available in producing good concrete that is suitable for different applications.

SEAA 4203 Stability and Dynamics of Structures

Pre-requisite: SEAA 3243 Theory of Structures

SEAA 4223 Structural Analysis

This is an elective course that is offered to final year undergraduate students. The structural dynamics covers introduction, natural frequency, single degree of freedom, multi-degree of freedom system, Eigenvalues and Eigenvectors, free vibration response. Structural instability covers concept, simple model, Euler column instability, stability functions, Bolton Method and Horne Method. At the end of the course the students should be able to solve numerous problems which involves dynamics and instability. The students will also be able to develop and master the skills of reducing any problems from its physical description to a model or symbolic representative to which the principles may be applied.

SEAA 4243 Finite Element Method

Pre-requisite: SEAA 4223 Structural Analysis

This course is developed to expose students to the fundamental theory and application of the finite element method. The course covers linear analyses for displacements and stresses in continuum structures. Formulation of stiffness matrices for one-dimensional elements, beams, plane stress and plane strain are presented in detail. Grillage, plate bending, shell, Axisymmetric and solid elements are also discussed. Isoperimetric formulation is emphasized.

Use of finite element software for modeling and analysis is also emphasized. At the end of the course, students should be able to apply the finite element method by hand calculation for simple problems. For more complicated problems, the students should be able to create finite element model, choose correct elements, analyze and interpret results using Finite Element software. Students also should be able to analyze practical problems by implementation through final project and make class presentation to

demonstrate their understanding about the course materials.

SEAA 4263 Earthquake and Wind Engineering

This is an optional course. In the early stage, introduction to structural design and dynamic effect from wind and earthquake is revealed. Steps and method of structural design for wind load will be discussed. Then, engineering aspect in seismology will be discussed.

Other than that, seismic reaction on structure, general consideration on earthquake resistant design and seismic behavior of structural system will be taught. Students will also be introduced with the permanent earthquake resistant design and structural earthquake resistant design. Lastly, some issues on special topics in Earthquake Engineering will be discussed.

SEAA 4273 Maintenance of Seismic Structures and Materials

This is an optional subject. This subject gives an introduction on seismic maintenance and concepts related to it. Dynamic analysis with computer will also be introduced. Topics related including non-linear seismic analysis, structure and earth interaction, base separation and energy dissipation device.

SEAA 4293 Advanced Solid Mechanics

This course is designed to discuss the theories of elasticity and to provide the mathematical background for finite element applications. The course begins with the discussion of the basic concepts in elasticity covering tensors notations, analysis of stress and strain and the constitutive equations. The course continues with the discussion of the variation approach in solid mechanics focusing on the application of the stationary potential energy principle. At the end of the course, students should be able to understand multidimensional states and analyses through the ability to utilize the compact notations of tensors.

SEAA 4313 Advanced Reinforced Concrete Design

Pre-requisite: SEAA 4333 Reinforced Concrete Design 2

This is elective course which will provide extra knowledge on the aspect of design of reinforced concrete structural elements. As a continuation to the Reinforced Concrete Design 1 and 2, the topics discussed are analysis and design of ribbed, waffle and flat slabs, water retaining structures, shear walls, corbel and nibs. Furthermore students will be exposed to the methods of deflection calculation, design of elements for torsion and design of raft

foundations.

SEAA 4323 Prestressed Concrete Design

Pre-requisite: SEAA 3352 Reinforced Concrete Design I

This is an elective course, which will provide students an understanding and ability to analyze and design prestressed concrete structural elements. Topics discussed include the concept and principles of prestressing, methods of prestressing concrete, stress limits, losses of prestress, and selection of section, serviceability and strength requirements. Students will also be exposed to the complete analysis and design procedure of simply supported prestressed concrete non-composite and composite beams, and design principles of continuous beams.

SEAA 4383 Analysis and Design of Tall Building Systems

The subject emphasized on the analysis and design of tall buildings structural system. It covers a fundamental to tall building structures and related issue in analysis and design from around the world. The students will be guided through the Code of Practice basic requirement of analysis and design of tall buildings. The ultimate behavior, analysis and design of tall building structural elements such as from basic element of reinforced concrete plates, formation of frames structures, composition of shear walls and core wall of structures will be checked and explain before the students are guided through the real analysis and design of various shapes of buildings. Finally, detailing of shear walls and core walls will be explained together with the behavior of infills of frame structures.

SEAA 4433 Advanced Computer Programming

Pre-requisite: SKAA 3413 Computer Programming

This course is designed to expose the students in designing and developing computer program using suitable programming languages such as visual basic and active server pages. It will emphasize on the general concepts of computer programming, steps of problem solving using computer program, advanced interface design, graphic, multimedia, animation, database design and web programming. The course will also provide hands- on session for the students to solve tutorials and problems given that related to civil engineering fields.

At the end of the course, students should be able to understand the steps in problems solving and apply the knowledge to identify and analyze civil engineering problems that require computer programming solutions. The students should also be able to design and write the computer program to

solve the problems.

SEAA 4463 Construction Integration Environment

Pre-requisite: SKAA 3412 Building Information Modelling and Data Management

This subject is concerned with the Integrated Construction Environment (ICE) which involves coordinating the integration process between various construction applications. Such an environment will provide a platform whereby the Architectural, Engineering and Construction (AEC) can share and exchange information. The progress of information technology (IT) in the construction industry relies on the ability of the project participants to exchange and share information among themselves and manage the Information System (MIS).

The student is expected to gain some knowledge on the Computer Integrated Construction (CIC) which is an emerging technology to automate the flow and exchanging of construction project information. They will be exposed to Information Modeling, E-Construction, Internet, Networking, Artificial Intelligence and Groupware. The use of a database management system (DBMS) and Standardization to manipulate information will give the student a further step in order to apply an IT application in solving their construction problems. In the new development on the current research and development (R&D), the applications of IT in the construction are becoming more important, especially in the new era of globalization. Therefore, the new generation of civil engineers should be equipped with this knowledge to stay competitive in the industry.

SEAA 4473 Geographic Information System

This course is an elective course specially designed for civil engineering students who always have to manipulate huge amounts of spatial data. It concerns the management of information (spatially and attribute) and how to model it in a structured manner. This course will emphasize the overview and the application of GIS in civil engineering, GIS data structure, data manipulation and GIS implementation, information presentation of GIS, and a review of GIS software and sample applications. The development of a prototype system is also highlighted in this course in order to give the student a proper technique for developing an application. At the end of the course, students will be able to plan, analyze, and model the information for developing GIS applications related to civil engineering problems.

SEAA 4523 Coastal Engineering

Pre-requisite: SEAA 2513 Hydraulics

The course covers theoretical and fundamental principles of coastal hydrodynamics and processes. It gives background knowledge of the various hydrodynamic parameters acting in the coastal region due to waves, tides and currents. Sediment transport mechanism in the littoral zone leading to the understanding of coastal morphology, erosion and accretion processes are described. Underlying principles of coastal engineering works, coastal erosion management and implications from implementing coastal structures in the coastal environment are delivered. Emphasis in solving and tackling coastal engineering problems adopts the use of established analytical techniques. The application of state-of-the-art computational techniques as a tool in several aspects of coastal engineering and management works are introduced. At the end of the course, students should be able to describe and analyze the various coastal processes and the effect of these forces on the coastal zone. The students should be able to quantify coastal environmental parameters. They should also be capable of proposing methods to control the processes using analytical techniques and evaluate results yielded by computational techniques when applied to solve coastal engineering problems.

SEAA 4613 Water Resources Management

Pre-requisite: SEAA 1513 Fluid Mechanics

SEAA 3613 Hydrology and Water Resources

This is an elective course aim to equip students with in-depth knowledge in water resources design and management. This course highlights major water resources management issues with the emphasis on the integration of various management components. While the course contents maintain the technical elements of water resources system and engineering, students are also exposed to the realities of the political, economic, and social settings that influent the decision making process. Upon completion of this course, the students should be able to demonstrate the diverse and complicated issues in water resource management, discuss the need and steps for integrated management approach, analyze and determine viable project options, propose appropriate management strategies, and apply the appropriate techniques and strategies in reservoir planning and design.

SKAA 4623 Urban Storm water Management

Pre-requisite: SEAA 1513 Fluid Mechanics

SEAA 3613 Hydrology & Water Resources

The course covers the theoretical aspects and design of urban storm water drainage system. It is intended to introduce students to the fundamentals of storm water drainage system design. Methods of hydrologic design, rainfall design, flood estimation, rainfall-runoff relationship and flood routing will be taught. This will involve the planning, analysis, design and management for the quantity aspect.