Bachelor Plan

College of Engineering

Bachelor of Technology in Civil Engineering (2+2)

	Course Code	Course name	Pre-R	Co-R	Credit Hours	Contact Hours	Course Type
Semester 1	21SMAT310	Engineering Mathematics	N/A	N/A	3		
	21SMAT311	Engineering Physics A	N/A	N/A	3		
	21SMAT313	Engineering Physics A Lab	N/A	21SMAT311	1		
	21SCVE310	Engineering Skills (PBL)	N/A	N/A	3		
	21SCVE311	Civil Construction	N/A	N/A	3		
				Semester Total	13		
Semester 2	21SCVE320	Solid Mechanics	21SMAT310	N/A	3		
	21SCVE321	Hydraulics	21SMAT311	N/A	3		
	21SCVE322	Analysis of Structures	21SMAT310	N/A	3		
	21SCVE323	Engineering Design: Planning (PBL)	21SCVE310	21SCVE324	3		
	21SCVE324	Engineering Management: Planning (PBL)	21SCVE310	21SCVE323	3		
				Semester Total	15		
Semester 3	21SCVE333	Internship (Optional)	21SCVE323 21SCVE324	N/A	3		
	21SCVE410	Technology Project Planning (PBL)	21SCVE323 21SCVE324 21SMAT310 21SMAT311	N/A	3		
	21SCVE411	Concrete Structures	21SCVE311 21SCVE320 21SCVE322	N/A	3		
	21SCVE412	Geotechnical Engineering	21SCVE311 21SCVE320 21SCVE321	N/A	3		
	21SCVE413	Engineering Design: Implementation (PBL)	21SCVE323 21SCVE324	21SCVE414	3		
	21SCVE414	Engineering Management: Implementation (PBL)	21SCVE323 21SCVE324	21SCVE413	3		
	21SCVE415	Concrete Structures Lab	21SCVE311 21SCVE320 21SCVE322	21SCVE411	1		
				Semester Total	16		
Semester 4	21SCVE420	Technology Project Implementation (PBL)	21SCVE410	N/A	3		
	21SCVE421	Traffic Engineering	21SCVE320	N/A	3		
	21SCVE422	Steel Structures	21SCVE320 21SCVE322	N/A	3		
	21SCVE423	Water Environmental Design (PBL)	21SCVE321 21SCVE323 21SCVE324	21SCVE424	3		
	21SCVE424	Wastewater Environmental Design (PBL)	21SCVE321 21SCVE323 21SCVE324	21SCVE423	3		
	21SCVE425	Traffic Engineering Lab	21SCVE320	21SCVE421	1		
				Semester Total	16		
				Program Total	60		

Units Distribution

SEMESTER 1

1. 21SMAT310 Engineering Mathematics

In this course students apply the essential calculus concepts, processes and techniques to develop mathematical models for engineering problems. They use the Fundamental Theorem of Calculus to illustrate the relationship between the derivative and the integral of a function and apply the theorem to engineering problems involving definite integrals. Differential calculus is used to construct mathematical models, which investigate a variety of rate of change and optimization problems. The standard rules and techniques of integration are included. Differential equations are introduced and applied to investigate more interesting problems in an engineering setting. Other important elements of this course are the communication of results, concepts and ideas using mathematics as a language, being able to document the solution to problems in a way that demonstrates a clear, logical and precise approach and communicating, working and learning in peer learning teams where appropriate.
Credits: 3
Prerequisite: None

2. 21SMAT311 Engineering Physics A

This course introduces the principles of engineering physics and aims to develop a fundamental understanding of several broad areas of physics (mechanics, fluids, wave properties, properties of matter and heat) applied to engineering and technology.
Credits: 3
Prerequisite: None

3. 21SMAT313 Engineering Physics A Lab

The laboratory experiments performed in this course complement the material covered in the Physics I/ Engineering Physics A lecture course. This lab course mainly covers the topics of Classical Mechanics. The main goal of this lab course is to demonstrate the techniques used to carry out experimental physics. In this course students will be doing hands-on, collaborative activities that illustrate the key topics from the lecture. Upon successful completion of this course students will be able to:

1. Ability to measure and compute basic quantities in mechanics related to motion, force, energy and momentum.
2. Prepare a written laboratory report that effectively interprets and communicates the results.
3. Ability to apply experimental principles and error calculations to mechanics.

Credits: 1
Prerequisite: None
Corequisite: 21SMAT311

4. 21SCVE310 Engineering Skills (PBL)

Students are introduced to the role of professional engineers as mediators between the technical, business, social, cultural, environmental, economic and political contexts of engineering activities. They investigate and select materials and processes for engineering applications and justify decisions made. Students apply information literacy skills and information technology skills to engineering projects; they use drawing, modeling and simulation tools to analyze and present project outcomes; they apply risk assessment and workplace health and safety assessment to engineering activities; and they design, conduct and report on practical, hands-on activities. The learning is supported by compulsory class sessions. Students explore the complex nature of engineering activities and the need to deal with uncertainty and conflicting information, they prepare a portfolio to demonstrate development of a professional attitude, problem-solving skills, technical knowledge and productive work practices, and provide evidence of a professional capacity to communicate, work and learn productively, both individually and in teams.

Credits: 3

Prerequisite: None

5. 21SCVE311 Civil Construction

Students are introduced to the roles of civil construction team members, use of typical project documents, application of Standards, acts and regulations and construction processes to civil earthworks, temporary works, substructure works and superstructure works for routine construction projects. Students conduct research, prepare reports and presentations and work independently and in teams in a professional manner.

Credits: 3

Prerequisite: None

SEMESTER 2

6. 21SCVE320 Solid Mechanics

Students will use the principles of engineering mechanics to analyze structural members subjected to torsion, bending and shear stresses. Principle stresses will be calculated for members subjected to combined stresses. The course outlines modes of failure including fatigue in engineering materials. Students use appropriate "civil engineering language" in context, document the process of modeling and analysis and present information, and communicate, work and learn, both individually and in teams in a professional manner.

Credits: 3

Prerequisite: 21SMAT310

7. 21SCVE321 Hydraulics

Hydraulics introduces the analysis of hydrostatic and buoyancy effects and analysis of flow pipe systems and in open channels. Students use knowledge of fundamental properties of fluids to analyze problems involving static and moving fluids. Students analyze and design pipe systems and networks, and open channels and related hydraulic structures. The course presents methods for calculating energy and surface profiles in open channel flow, the operation and selection of pumps and turbines, and the use of similitude principles for modeling hydraulic effects. It requires students to learn to work autonomously and emphasizes the importance of clear, professional documentation of the approach taken in analysis of hydraulics problems.

Credits: 3

Prerequisite: 21SMAT311

8. 21SCVE322 Analysis of Structures

In this course students analyze the determinacy and stability and the implications this has for structural analysis. They determine reactions, internal forces and displacements of structures, and analyze beams with moving loads, using analysis software and approximate methods of analysis. Students use appropriate “civil engineering language” in context, document the process of modeling and analysis and present information, and communicate, work and learn, both individually and in teams in a professional manner.

Credits: 3

Prerequisite: 21SMAT310

9. 21SCVE323 Engineering Design: Planning (PBL)

In this course, students produce a conceptual design and project specifications aligned with relevant standards and current engineering practice given a loosely formed client brief. They demonstrate and justify the incorporation of a systems approach to design activities based on a broad sustainability framework. Students identify, justify and apply the technical knowledge and skills required to successfully complete an engineering project, and produce professional and technically competent design documentation. Students prepare a portfolio to demonstrate development of a professional attitude, problem-solving skills, technical knowledge and productive work practices, and they provide evidence of a professional capacity

to communicate, work and learn productively, both individually and in teams. The learning is supported by compulsory class sessions.
Credits: 3
Prerequisite: 21SCVE310
Corequisite: 21SCVE324

10. 21SCVE324 Engineering Management: Planning (PBL)

In this course students should be able to apply project management techniques to plan engineering projects. They reflect on project activities and develop and describe their personal framework for engineering design and project management. They describe and explain the conduct and management of engineering enterprises and of the structure and capabilities of the engineering workforce. Students produce professional and technically competent project management documentation. Students prepare a portfolio to demonstrate development of a professional attitude, problem-solving skills, technical knowledge and productive work practices, and they provide evidence of a professional capacity to communicate, work and learn productively, both individually and in teams. The learning is supported by compulsory class sessions.
Credits: 3
Prerequisite: 21SCVE310
Corequisite: 21SCVE323

SEMESTER 3

11. 21SCVE333 Internship

This course covers the professional experience, through training in the execution of real-life engineering projects. Practical training aims at developing practical skills for the student so that he/she might develop an awareness of job requirements and become qualified to practice a specialization in a sound and systematic way. It might also help a student to find or locate later job opportunities at the same training site if he/she is able to demonstrate competence and obtain the satisfaction of the Field Supervisor and those responsible at the site.
Credits: 3
Prerequisite: 21SCVE323 and 16SCVE324

12. 21SCVE410 Technology Project Planning (PBL)

Students in the final year of their Bachelor of Engineering Technology program work independently to find and plan a project that allows them to demonstrate professional capabilities expected of graduating engineering technologists. Formal and informal project reporting articulates the analysis of project planning issues and critical thinking behind project choices and decisions made. Students report to and work with guidance from a supervisor to scope and define the project, undertake research into project issues, incorporate safety and risk issues, produce a plan and schedule for implementation of the project in the subsequent project implementation course, and produce informal and formal projects reports and presentations.
Credits: 3
Prerequisite: 21SCVE323, 21SCVE324, 21SMAT310, and 21SMAT311

13. 21SCVE411 Concrete Structures

This course introduces the principles and practices of design of concrete structures conforming to the American Concrete Institute (ACI). Structural systems and load paths for gravity and lateral loading are identified and determined. State-of-the-art construction materials are reviewed in the context of sustainability and environmental issues. Students interpret and apply standards to design concrete structural components such as beams, slabs, columns, footings and retaining walls using ultimate and serviceability limit states. This course also covers the basics of reinforcement detailing in different concrete members.
Credits: 3
Prerequisite: 21SCVE311, 21SCVE320, and 21SCVE322

14. 21SCVE412 Geotechnical Engineering

The course presents geological processes that produce landforms and geological structures, rocks and soils, and introduces the effect of geological factors on the location, design, construction and maintenance of civil engineering projects. Students conduct geotechnical tests, analyze test data, prepare geotechnical reports, discuss the engineering characteristics and properties of soil. They select appropriate approaches for analyzing behavior of soils in

response to engineering applications. They will use appropriate "civil engineering language" in context; document the process of modeling and analysis of soils. Students present information in a professional manner and communicate, work and learn, both individually and in teams.
Credits: 3
Prerequisite: 21SCVE311, 21SCVE320, and 21SCVE321

15. 21SCVE413 Engineering Design: Implementation (PBL)

In this course students should be able to apply techniques of conceptual design of engineering projects. They reflect on project activities and continue to develop and describe their personal framework for engineering design. Students design or select components and elements required for a project and develop a detailed project design consistent with relevant Standards and current engineering practice given a conceptual design and client approved project specifications. They model and evaluate the detailed design and demonstrate and justify the incorporation of a systems approach to design activities based on a broad sustainability framework. Students identify, justify and apply the technical knowledge and skills required to successfully complete an engineering project and produce professional and technically competent project design documentation. Students prepare a portfolio to demonstrate development of a professional problem-solving skills, and technical knowledge. They provide evidence of a professional capacity to communicate, work and learn productively, both individually and in teams.
Credits: 3
Prerequisite: 21SCVE323 and 21SCVE324
Corequisite: 21SCVE414

16. 21SCVE414 Engineering Management: Implementation (PBL)

In this course students should be able to apply project management techniques to implement an engineering project from previous conceptual design. They reflect on project activities and continue to develop and describe their personal framework for engineering project management. Students implement a project that includes physical models and prototypes based on implementation management documentations. They apply the technical knowledge and skills required to successfully complete an engineering project, and produce professional and technically competent project management documentation. Students prepare a portfolio to demonstrate development of a professional attitude; problem-solving skills, technical knowledge and productive work practices, and they provide evidence of a professional capacity to communicate, work and learn productively, both individually and in teams.
Credits: 3
Prerequisite: 21SCVE323 and 21SCVE324
Corequisite: 21SCVE413

17. 21SCVE415 Concrete Structures Lab

In this unit, students plan, prepare and carry out tests on structural concrete components, they interpret results and prepare test reports. The social and cultural context of concrete building design and serviceability requirements are integrated in the design process through individual/team work that focuses on development of professionalism, ethical practice, problem solving and communication.

Credits: 1

Prerequisite: 21SCVE311, 21SCVE320, and 21SCVE322

Corequisite: 21SCVE411

SEMESTER 4

18. 21SCVE420 Technology Project Implementation (PBL)

The purpose of this course is to provide students who are in the final year of their program with an opportunity to carry out an authentic work assignment type project, which closely approximates technologist's activities in industry. It is expected that while carrying out the project, students will develop their expertise as well as practice skills in the project's discipline are.

Credits: 3

Prerequisite: 21SCVE410

19. 21SCVE421 Traffic Engineering

The purpose of this course is to provide students with a solid introduction to the principles of transportation engineering with a focus on traffic analysis and highway engineering. The material learned will provide the basic skill set that will allow students to describe and explain the fundamental concepts and characteristics of traffic engineering systems. Students are required to communicate, work and learn, both independently and collaboratively, in a professional manner.

Credits: 3

Prerequisites: 21SCVE320

20. 21SCVE422 Steel Structures

This course introduces Standard design methodology for major steel structural components. Basic material and section properties and factors affecting the properties of structural members are introduced. Students design steel members and connections for axial loads, bending, torsion and combined actions and explain the design processes they use. They develop skills in use of the technical language of structural steel design and in the documentation and checking of designs. Students work, learn and communicate in a professional manner, alone and in teams, and use information literacy skills to investigate design problems and present solutions.

Credits: 3

Prerequisite: 21SCVE320 and 16SCVE322

21. 21SCVE423 Water Environmental Design (PBL)

Students undertake projects in water and environmental design, deliver project reports, and develop skills to communicate, work and learn professionally. They analyze the population growth using different forecast methods and calculate the water flows required for future populations. They perform analyses of source water characteristics and select the drinking water treatment method. After acknowledgement of the drinking water quality using international and local guidelines and standards, students design the water treatment installations/plant. The design considers technical, economic and environmental issues. Apart

from the project portfolio, students are assessed on water treatment methods, the World Health Organization (WHO) guidelines for drinking water quality as well as drinking water (tap and bottled water) quality in Kuwait.
Credits: 3
Prerequisite: 21SCVE321, 21SCVE3223, and 21SCVE324
Corequisite: 21SCVE424

22. 21SCVE424 Wastewater Environmental Design (PBL)

Students undertake projects in wastewater and environmental design, deliver project reports, and develop skills to communicate, work and learn professionally. They analyze the population growth using different forecast methods and calculate the wastewater flows required for future populations. After acknowledgement of threshold values for recycled wastewater using international and local guidelines and standards such as Environmental Protection Agency (EPA), students design the wastewater treatment installations/plant. The design considers technical, economic and environmental issues. Apart from the project portfolio, students are assessed on wastewater treatment methods and the EPA guidelines for water reuse.
Credits: 3
Prerequisite: 21SCVE321, 21SCVE3223, and 21SCVE324
Corequisite: 21SCVE423

23. 21SCVE425 Traffic Engineering Lab

In this practical course, students will learn to collect, interpret and analyze traffic survey data, then apply them to analysis of traffic flow and estimation of system capacity. Students will use state of the art techniques and software to design and analyze intersections, roundabouts and traffic signals. Students are required to communicate, work and learn, both independently and collaboratively, in a professional manner.
Credits: 1
Prerequisite: 21SCVE320
Corequisite: 21SCVE421