جامعة الملك سعود
King Saud University

GRADUATE STUDENT HANDBOOK

DEPARTMENT OF CIVIL ENGINEERING

COLLEGE OF ENGINEERING
KING SAUD UNIVERSITY

May 2025

Handbook
For
Civil Engineering Graduate Students
(M.Sc. and Ph.D. Students)

Department of Civil Engineering
College of Engineering
King Saud University

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PART A. DEPARTMENT OF CIVIL ENGINEERING

1. About the Department

The Civil Engineering Department is one of the earliest departments established in the Kingdom's universities. The department was established in 1382H (1962). The department makes an indispensable contribution to the development and advancement of the Kingdom. Department graduates play a vital role in all development plans of the country. They are heavily involved in construction, transportation, water, environment protection, project management, and soil treatment engineering projects. The department is continuously updating the curricula of undergraduate and graduate programs to keep pace with the national and international developments.

Civil engineering is one of the main pillars of the advancement of any country through establishing the infrastructure projects necessary to the welfare of human being. Since its establishment, the civil engineering department has effectively contributed to the rapid development of the Kingdom. The graduates hold key positions in all governmental and private sectors.

The department is fully equipped with high-quality laboratories and workshops that cover all aspects of civil engineering. These laboratories and workshops are subjected to continuous updating to keep pace with the latest technology requirements.

The diverse areas of specialty associated with civil engineering provide graduates with excellent job opportunities both in the governmental and in the private sectors.

Contact Information

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King Saud University - 2792
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2. Graduate Program in Civil Engineering

The graduate studies in the Civil Engineering Department (CED) started in 1401H (1981G) with the M.Sc. degree in Civil Engineering, followed by the Ph.D. program in Civil Engineering (CE) in 1420H (2000G). The Civil Engineering Department leads national progress by preparing graduates to design, manage, and innovate essential utility infrastructure-such as water, wastewater, power, and transportation systems-supported by advanced laboratories and continually updated curricula to meet evolving technological and societal needs

The M.Sc. and Ph.D. degrees in Civil Engineering are available in the following CE specializations:

- Structural Engineering
- Water Resources Engineering
- Transportation Engineering
- Environmental Engineering
- Construction Engineering and Management
- Geotechnical Engineering

2.1. Vision

To be a globally recognized graduate program in civil engineering education, innovation and technological advancement in building the knowledge economy.

2.2. Mission

Provide a distinguished high-quality graduate education program to promote Civil Engineering applications and produce specialized Civil Engineers to attain a sustainable excellence in Civil Engineering industry during the 21st century, and to serve the society through involvement in knowledge sharing outreach, innovative research, developing new technologies, continuing education and professional activities.

2.3. Program Objectives

Graduates of M.Sc. program are prepared to:

- PEO1: Integrate specialized knowledge with critical thinking and modern techniques to solve complex real-life civil engineering problems.
- PEO2: Enhance technical awareness, leadership, and professional skills by conducting scientific research and projects while engaging in lifelong learning,

maintaining high levels of scientific integrity, ethical responsibility, and autonomy.

- PEO3: Produce novel, advanced, and effective systems to achieve excellence in civil engineering infrastructure and provide solutions that meet society's needs and challenges

Graduates of the Ph.D. program are prepared to:

- Provide a distinguished Ph.D. Program to prepare graduates to be pioneers in the specialized fields of Civil Engineering, with exceptional insight and proficiency in specialized topics to provide quality solutions and awareness.
- Develop independent experts that can effectively communicate ideas and research, with the capacity to continuously improve their knowledge and skills.
- Promote the integrity and devotion of graduates to excel and create value that contributes to the advancement of society, economy, and environment.

2.4. Program Outcomes

- Students completing the *M.Sc.* program will be able to:

SO 1: Recognize advanced engineering knowledge, concepts, and techniques to identify, interpret, and analyze complex and real-life engineering problems.

SO 2: Provide solutions for complex and real-life engineering problems through critical thinking and the use of modern engineering tools, and identify their impact on social, global, cultural, environmental, safety, and economic factors.

SO 3: Investigate scientific research problems independently or through teamwork using critical thinking, appropriate techniques, advanced tools, and management principles.

SO 4: Criticize and discuss scientific research reports /papers related to Civil Engineering issues with a high level of ethics proficiency and communication skills, independently, or as a teamwork.

SO 5: Design novel advanced Civil Engineering systems and evaluate their performance, sustainability, and effectiveness for engineering practice and their impact in global, economic, environmental, and societal contexts

SO 6: Demonstrate scientific integrity, ethical responsibility, and academic values in scientific publications, research projects, and thesis work.

SO 7: Effectively manage, individually or in groups, specialized tasks and activities in coursework, projects, assignments, and research work with a high level of autonomy and responsibility.

- The Ph.D. Program prepares the graduates to be able to develop in:

A. Knowledge

- Acquire advanced civil engineering knowledge related to various processes, novel concepts, new materials, advanced techniques, practices, and specialized theories (K1).
- Integrate complex information, comprehensive critical knowledge and recent developments to create new and leading expertise (K2).

B. Skills

- Apply complex information and advanced critical knowledge to conduct original research contributing to civil engineering challenges and advancements (S1).
- Evaluate and critically review emerging concepts, principles and theories to develop creative and innovative solutions for complex civil engineering issues (S2).
- Apply and adapt advanced technological tools and applications to support cutting-edge research and innovations (S2).

C. Values, Autonomy, and Responsibility

- Collaborate and professionally assign specialized tasks in multidisciplinary research activities and professional projects to provide a knowledge-based–society and enhance the quality of life (V1).
- Demonstrate and promote potent ethical and professional values, with notable academic integrity while advancing in knowledge, research, and professional practices (V2).

3. Civil Engineering Department Laboratories

Laboratories play an essential role in serving academic and research programs for students and faculty members of the Civil Engineering Department. In addition, these laboratories conduct research and experimental tests for several public and private sectors. The department has many laboratories in all fields of Civil Engineering, which includes:

- Structural Engineering Laboratories
- Hydraulics and Fluid Mechanics Laboratories
- Environmental Engineering Laboratories
- Transportation Engineering Laboratory
- Soil Mechanics & Geotechnical Engineering Laboratories
- Surveying Engineering Laboratories

The laboratories hold modern and technically advanced instruments, for more information about the equipment variable at the Civil Engineering Department, please visit the following website. https://engineering.ksu.edu.sa/en/Laboratories

4. Research Chairs and Center of Excellence

The Department has established different research chairs and center of excellence. More than 30 staff members are working in these chairs and centers as professors, research fellows, research assistants, lab engineers and lab technicians. A brief description of research chairs and center of excellence is given below.

4.1. Chair of Research and Studies in Rehabilitation and Upgrading of Structures:

The chair was established in 2008. Undoubtedly, the establishment of Sheikh Mohammed Chair (SMC) would be an essential element for the completion of the system that will work through studies and researches on modern techniques to rehabilitate structures suffering from the deterioration or needed to be strengthened to be able to bear that loads which were not taken into account at the design stage such as seismic and/or wind forces as per the Saudi Building Code.

4.2. Eng. Abdullah Bogshan Chair in Expansive Soils.

Eng. Abdullah Bogshan Research was established in 2008, Promoting a scientific environment that fosters innovation and undertaking of cutting-edge research in various

aspects related to expansive soils including swelling behavior, treatment and foundation systems. The main objective is implementing and utilizing research results for the benefits of building industry in the Kingdom capitalizing on the university resources and facilities.

4.3. Center of Excellence for Concrete Research & Testing

The Center of Excellence for Concrete Research and Testing (CoE-CRT) was established in May 2008. The main focus of CoE-CRT is on continuous improvements of the quality of concrete production and construction, research and development, education and training and updating of codes and specifications. The Center will support long-term concrete research and development leading to potential breakthroughs in concrete materials development and utilization. The Center will support, promote, and develop the research capabilities and professional activities and offer assistance to cement, concrete and construction industries, regulatory agencies such as Saudi Building Code National Committee (SBCNC), Saudi Arabian Standards Organization (SASO) and other public and private sectors which are in need for the Center's expertise, facilities and laboratories.

5. Graduate Studies Coordinator

Tasks and Responsibilities:

- Receiving the list of applicants from the Deanship of Graduate Studies and distributing this list to the appropriate specialized groups within the department
- Reviewing short-listed applicants to ensure the selection is in accordance with the admission requirements of the department and providing a report to the chair.
- Submitting the selected applicants to the Deanship of Graduate Studies through their online system
- Providing the orientation to the new students
- Monitoring the academic guidance and counseling to the students
- Monitoring thesis proposals and thesis defense of research students
- Maintaining the record of the students and analyzing the academic progress regularly
- Tracking the progress of students to ensure the time-bound completion of the M.Sc. program

6. Graduate Studies Committee

The Graduate Studies Committee assists the department council in ensuring the maintaining of the highest standards and quality in teaching, learning, research, and scholarship. It advises the department council about policy and procedures relating to postgraduate study at the University. It determines postgraduate matters, including the approval of new and amended courses, according to the King Saud University policy and the National Commission for Academic Accreditation and Assessment requirement for graduate studies. GDC consist of graduate convener and Graduate coordinator and faculty members from specialized groups within the department.

Tasks and Responsibilities:

- Develop, maintain, and monitor policy and procedures for the operation of the Department's graduate program, consistent with Graduate Studies Deanship rules.
- Prepare, publish, and distribute documents describing the Department and describing policies, rules and procedures for Department programs, including maintaining and issuing M.S. and Ph.D. brochures.
- Handle administrative tasks necessary to keep the graduate program operating in accordance with Departmental and University rules and regulations.
- Establishing new non-thesis M.Sc. program in the department
- Developing criteria for new applicants and maintaining regulations of the department for the selection process
- Develop and maintain procedures to estimate graduate
- Provide assistance, as required, to the curriculum committee.
- Updating/revising the criteria for new applicants and maintaining the regulations of the department for the selection process.
- Providing assistance to graduate studies convener and coordinator when needed.
- Following up with Accreditation committee for NCAAA process
- Approve applications to graduate for M.S. and Ph.D. students.

PART B. ACADEMIC PROGRAMS, REQUIREMENTS, AND POLICY

1. General regulation in the M.Sc. and Ph.D. Programs

On the recommendation of the Graduate Studies Deanship Council, the University Council set detailed criteria for endorsing graduate programs. The following measures should be considered:

a. The initiating department should have enough faculty members (professors and associate professors) specialized in the program area, in addition to research facilities to ensure the success of the program in terms of teaching, supervision, and research.

b. The department should have gained appropriate experience on the undergraduate level if proposing a master program and so on the master level if the proposed program is a doctorate one.

c. Expectancy of students' number to enroll in the program should be sufficient to ensure proper continuity.

Considering measures enforced in Item VII of the Unified Law Organizing the Graduate Studies in Saudi Universities, the initiating department submits a detailed program draft to its College Council, elucidating the following:

a. Program's objectives and the extent of need for it in the Saudi society.

b. Nature of the program in terms of academic and professional focus and scientific methodology.

c. The importance of the program and the justifications for initiating it, considering its availability inside the university or outside in other universities in the Kingdom.

d. Available and required facilities in the department to allow proper academic and professional running of the program, and identifying main research areas of the department.

e. Ratio of faculty members' stability in the department over the past five years.

f. Curriculum Vitae of faculty members in the department and of those associated with the program at the university.

The Graduate Studies Deanship Council examines program draft, coordinates with extant programs, if any, to preclude duplication, and, on being satisfied, recommends program to the University Council for endorsement.

The University Council issues resolution on course amendments, programs' requirements, and admission conditions on the recommendation of the Graduate Studies Deanship Council as coordinated with relevant departments. Joint graduate programs between two departments (or more) and two colleges (or more) can be established at the university according to rules set by the University Council on the recommendation of the Graduate Studies Deanship Council in coordination with relevant departments.

Studying for a master's degree is possible through one of the two following options:

a. Thesis option: of minimally twenty-four hours of graduate courses plus a thesis.
b. Coursework option: in some disciplines of professional nature, provided that study units are minimally forty-two hours of graduate courses inclusive of three units' research project.

The study plan for a master's degree should preferably include graduate courses related to specialization from other departments whenever possible.

Studying for a doctorate degree is possible through one of the following two options:

a. Course/Thesis option: of minimally thirty hours of graduate, post-master courses plus a thesis.
b. Course/ Dissertation option: of minimally twelve hours of graduate courses of directed studies, symposia and seminars, as called for by student's academic interests and specific specializations, plus a dissertation.

2. Degree requirements

2.1. Credit hours

The number of study units covered by the graduate student at the degree-granting university should be minimally seventy percent of program required units; the student should also fully prepare the thesis/dissertation under the supervision of that university. The student shall only graduate on having completed all program requirements, provisionally with a minimum accumulative grade average of "Very Good".

2.2. Transfer Credit

Transfer of students to the university from another accredited university is possible upon the recommendation of both Department and College Councils and the Graduate Studies Deanship Council, taking into account the following regulations:

a. Local conditions for admission should apply to transfer students, in addition to any further conditions relevant departments may deem necessary.

b. The student should not have been dismissed (regardless of reasons) from the transferring university.

c. Courses studied earlier may be transferred, according to the following regulations:

   i. Courses should not have been completed more than six semesters ago.
   ii. Course content should be directly related to the program transferred to.
   iii. Courses transferred should not exceed thirty percent of the courses of the program transferred to.
   iv. Student's grade in transferred courses should minimally be "Very Good."
   v. Courses transferred are not included in the computation of the new cumulative average.
   vi. Transfer of courses should be based on the recommendation of the Department Council and the approval of both College and Graduate Studies Deanship Councils.

The student may transfer from one major to another in the university on the recommendation of respective department and college councils and approval of Graduate Studies Deanship Council. The following regulations should be considered:

a. Current conditions for admission should apply to transfer students in addition to any further conditions relevant department may deem necessary.

b. Courses already studied at the university may be transferred if related departments find them corresponding to their programs; they will be included in computing students' cumulative average.

c. Student's registration in a previous department should not for any reason have been repealed.

d. Time spent in the program transferred from shall be counted within the maximum time limit for obtaining the degree.

e. Transfer from one program to another is allowed only once during the period set for obtaining the degree.

2.3. Time Limits

Departments Councils may stipulate that students applying for a master or a doctorate program ought to complete a number of additional courses from the previous level. **The time limit** allotted to such courses should not exceed three semesters. The following conditions should also be taken into account:

a. A student should pass each additional course at first sitting with a minimum grade of "Good."

b. The cumulative grade average of the total number of additional courses should be a minimum of "Very Good."

c. Registration in the graduate program becomes possible after proper completion of additional courses; Department Councils may permit registration in some graduate courses hand in hand with one or two of the additional courses towards the end of this preliminary stage.

d. Time spent in additional courses is not counted within the time limit for obtaining the degree.

e. The grades of the additional courses are not included in the computation of the cumulative grade average of the graduate courses.

The academic year branches into two main semesters. The duration of each is minimally fifteen weeks (exclusive of registration and examinations periods). A summer session of minimally eight weeks, doubling the time span allotted to each course, is also available.

a. The duration for obtaining a master's degree is a minimum of four semesters and a maximum of eight; summer sessions are not counted within this period.

b. The duration for obtaining a doctorate degree is a minimum of six semesters and a maximum of ten; summer sessions are not counted within this period.

The maximum period for obtaining a degree starts with registration in graduate courses until the date of submission of the thesis (or any other program requirements) together with a report by student's supervisor to the Head of the Department.

2.4. Responsible Scholarship & Research Skills

The researcher should briefly point out the thesis subject and its significance in theory and practice, and reasons for choosing it in view of theresearch problem and data available. The researcher should briefly review the most significant previous studies relevant to the research subject, objectives and methods, identifying previous studies and their findings. The researcher should present a clear statement of the research topic and its objectives.

The researcher should explain the aims of the research to be articulated in the form of assumptions the study seeks to test or questions it tries to answer, the method the researcher intends to follow in order to fulfill the aim of the research, and tools used, including research methodology:

a. Identifying research methodology according to need (comparative, descriptive, analytical, quantitative, etc.).

b. Giving details of methodological procedures employed in collecting information and library data (preliminary and secondary references) as well as field, laboratory data, etc. and methods of analysis.

2.5. Admission

The University Council determines the annual number of students that will be admitted into graduate programs. Departments and colleges councils and recommended by will propose the number of students and the Graduate Studies Deanship Council will approv it. Admission into graduate programs requires the following:

a. Applicant should be a Saudi citizen or, if non-Saudi, have an official grant for graduate studies.

b. Applicant should be a university degree holder from a Saudi or an accredited university.

c. Applicant should be of good behavior, fair reputation and medically fit.

d. Applicants should submit two letters of recommendation from professors who taught him.

e. Applicants, if employed, should provide an employer's consent for studying. In cases that require it, consent submission can wait till registration period.

f. Applicants for a doctorate program should enroll as a full-time student.

Each university council can stipulate any additional conditions it deems necessary. The Diploma admission requirement is a minimum grade average of "good'' in the bachelor's degree. Admission requirement for a master program is a minimum grade average of "Very Good" in the bachelor's degree. However, the Graduate Studies Deanship Council can admit a student with a "high good" average, provided that student has scored a minimum of "Very Good" in specialization courses in the bachelor's degree.

The Graduate Studies Deanship Council can stipulate, on the recommendation of Departments Councils and support of Colleges Councils, any additional conditions it deems necessary for admission. Admission requirement for the doctorate program is a minimum grade average of "Very Good" in the master's degree, if awarded by a university that uses such a grading system. The Graduate Studies Deanship Council can stipulate, on the recommendation of Departments Councils and support of Colleges Councils, any additional conditions it deems necessary for admission.

A student may be admitted into a master's or doctorate program in a field different from his specialization. Such admission requires the recommendation of both Department and College Councils and the approval of the Graduate Studies Deanship Council. The Deanship of Graduate Studies admits students into graduate programs and registers them in coordination with the Deanship of Admission and Registration. Admission procedures are as follows:

a. Applicants should apply and submit full documents to the Deanship of Graduate Studies the first semester of the academic year preceding the one they would wish to enroll in.

b. The Deanship of Graduate Studies forwards documents to the respective departments.

c. Department Councils recommend students for admission, and documents of applicants are returned to the Deanship of Graduate Studies in two weeks from the date of recommendation.

d. The Graduate Studies Deanship Council issues decisions of students' admission.

e. The Deanship of Graduate Studies forwards all documents to the Deanship of Admission and Registration (keeping copies in the meanwhile) and provides respective departments with lists of admitted students at least two weeks before the registration period.

❖ M.Sc. Programs Admission Requirements

The following are the minimum basic requirements for potential candidates to be considered for M.Sc. Programs in the Department of Civil Engineering:

a. Bachelor's degree in civil engineering from a recognized institution with very good overall grade (GPA of 3.75/5 or 75% of marks or its equivalent). Official transcripts and degree certificates are required for the final admission.

b. Completion of English proficiency; TOEFL with a minimum score of 53 (Internet Base Test) or IELTS minimum score of 5.5. The score must be sent directly to the Deanship of Graduate Studies (KSU code for TOEFL is 7498 and for IELTS code is 147080).

c. Two recommendation letters from the faculty who taught the applicant at the university level courses.

❖ Ph.D. Programs Admission Requirements

The following are the minimum basic requirements for potential candidates to be considered for Ph.D. Programs in the Department of Civil Engineering:

a. Master's degree in a relevant field from a recognized institution with very good overall grade (4.25/5, 80% or its equivalent). Official transcripts and degree certificates are required for the final admission.

b. Bachelor's degree in civil engineering from a recognized institution with very good overall grade (GPA of 3.75/5 or 75% of marks or its equivalent).

c. Completion of English proficiency; TOEFL with a minimum score of 61 (Internet Base Test) or IELTS minimum score of 6.0. The score must be sent directly to the Deanship of Graduate Studies (KSU code for TOEFL is 7498 and for IELTS code is 147080).

d. Graduate Record Examination (GRE) minimum score required is 150 (Quantitative) or its equivalent. The score must be sent directly to the Deanship of Graduate Studies (KSU code is 2101).

e. Two recommendation letters from the faculty who taught the applicant at the university level courses.

2.6. Scholarship

King Saud University offer fully funded scholarships for Master of Science (M.Sc.) & degree of philosophy (Ph.D.).

Scholarship Requirements:

To be considered for the King Saud University Scholarship, you must:

- must have a high school diploma or its equivalent.
- have on the average, a very good secondary school certificate
  have not previously studied in a similar program in Saudi Arabia.
- be medically fit.
- not be more than twenty-five (25) years.
- must have (a close family member) residency in the Saudi Arabia or applying for the scholarship (Female applicants)

Scholarship Duration and Reward

- A monthly stipend is similar to a reward given to Saudi students in the same stage.
- The student is given an economy class ticket to come to the Kingdom for the first time, a round-trip ticket at the end of each academic to his country, and a one-way ticket at the end of his studying.
- The student will live in the university dorm free of charge.
- Free treatment will be provided to the student in all university hospitals
- A reduction in the value of the student's books weight at the end of his study on Saudi Arabian Airlines.

Required Documents

To apply for the King Saud University Scholarship, candidates must be ready to submit the following documents.

- Application Form
- International Passport
- Original copies of academic transcripts
- Recommendation letters
- a color copy of the original high school certificate.

The submitted documents should be fully ratified and authenticated by the following authorities:

- The Ministry of Education in the country from which the secondary certificate was issued or its substitute
- The Ministry of Foreign Affairs or its representative in the country where the secondary certificate was issued
- The documents submitted for the equivalency should be free from Any scraping or modification in its data and that the name of the owner is identical to his name in his previous study documents and in the passport.

where to apply?

https://dgs.ksu.edu.sa

https://dgs.ksu.edu.sa/Account/Login?ReturnUrl=%2F

https://graduatestudies.ksu.edu.sa/ar/node/2058

3. Comprehensive Exam

3.1. Comprehensive Examination for Ph.D. Students

Exam tests the depth and comprehensiveness of students' understanding of the main topics of their specialization (and sub-specialization if any).

The purpose of the exam is to evaluate the doctoral candidate's overall knowledge of relevant subject matter, to challenge the candidate's ability to critically evaluate the literature, and to assess their ability to effectively communicate and discuss scientific concepts both in written and oral formats. The skills thereby attained by students in the preparation for and performance of the Comprehensive Examination mark an important level of accomplishment in their scientific training.

The ability to consolidate knowledge and prepare critical summaries in a timely manner is an essential skill for the successful preparation of manuscripts, proposals, and reports, which graduate students, as new scientists, will encounter increasingly during their careers. In addition, successful completion of the exam ensures that the candidate possesses the background knowledge and reasoning skills necessary for the doctoral thesis defense.

Preparation for the Comprehensive Examination Candidates are expected to exhibit a general knowledge of their specialization in civil engineering, advanced knowledge in their general discipline (as defined by the candidate's examination committee), and detailed knowledge on their major discipline. Candidates are strongly advised to begin reviewing their general and advanced knowledge in preparation for the Comprehensive Examination immediately upon entering the doctoral program. The comprehensive exam should take place after completion of all required coursework. The design course CE 695 for the comprehensive exam should be registered by the beginning of the semester.

3.2. Dates of Exams

Generally, both parts of the comprehensive exam (written and oral) are held once in the semester between the fourth and the tenth week; a minimum of two weeks' time should separate the two. The Deanship sets the dates for the comprehensive exam and the timeline for its procedures, taking into account the following guidelines:

- The comprehensive exam committee must be formed before the start of the semester preceding the student's exam, and the Deanship should be notified accordingly.
- The student's registration form for the comprehensive exam should be submitted to the Deanship well in advance of the exam date.

3.3. Examination Committee

The Examination Committee will consist of at least three faculty members and one additional member to be chosen by the Graduate committee to be responsible for ensuring that the departmental comprehensive examination process is uniformly applied to all candidates.

The comprehensive examination committee is responsible for the following tasks:

a. The related department council sets up a committee of three faculty members specialized in the relevant field, with at least one member being a professor or associate professor in the student's area of specialization or in the approved sub-tracks within the program curriculum (if applicable).
b. The academic advisor should not serve as the chair of the comprehensive exam committee.
c. The committee may seek help from other specialized members of the department.
d. The committee shall be responsible for preparing, evaluating and determining the outcome of the exam.
e. In cases where a program includes specialization or sub-specialization outside the department, a specialist from the relevant department should participate in the exam committee.
f. The committee for both written and oral exams should be the same.
g. The comprehensive examination committee is responsible for the following tasks:
    - Supervising the preparation of comprehensive exam questions, model answers for the written section, and grading. The committee may consult other faculty members from within or outside the department/program, ensuring that questions are within the primary specialization and approved sub-tracks in the program curriculum (if applicable).
    - Evaluating students according to the templates prepared by the Deanship's of Graduate studies.
    - Submitting a report on student results to the department/program council no later than two weeks after the exam date.
    - Student results should be submitted to the graduate studies according to the comprehensive exam procedures schedule.

3.4. Comprehensive Exam Procedures

• The student will take the oral exam upon passing the written exam.
• If the student fails the exam or part of it, they are granted one opportunity within the academic year to retake the failed portion, according to the following conditions:

- **A.** If the student fails the written portion, they may retake it once. If they fail again, they will be dismissed.
- **B.** If the student passes the written exam on the first attempt but fails the oral portion, they are given one chance to retake the oral portion. If they fail again, they will be dismissed.
- **C.** If the student passes the written exam after a retake but fails the oral portion, they will be dismissed.

- **Written Comprehensive Examination**

a. Students sit for the exam during the semester following completion of course work. Sitting for the exam can be postponed with a recommendation from the graduate studies coordinator in the department and approval of the department council with notification sent to the Deanship, for one semester.

a. The duration of the exam is minimally five hours in main specialization and three for each sub-specialization (where applicable). Dividing exam writing into two separate periods is highly recommended.

b. In the event of failing the exam (or part of it) a student may re-sit for the failed part the following semester.

c. Failing the exam (or part of it) a second time would cause the student to be terminated from the program.

d. If the student passes the written exam after a re-sit but fails the oral portion, they will be dismissed.

e. The comprehensive exam retake for the failed portion will be conducted by the same examination committee.

f. If the student misses the comprehensive exam or any part of it without an excuse accepted by the comprehensive exam committee, they will be considered as having failed.

The Examination Committee will meet after performing the committee officially by Chairman of civil engineering which almost 5 weeks after registration of the comprehensive exam course. The Comprehensive Exam committee should set the exam questions prior the

end of semester by 6 week minimum. These questions should deal with topics that are related to the student's own research area.

In many cases the topics will be designed to strengthen the candidate's knowledge in an area of weak subjects. Essay topics are generally broad, covering an important area in the general discipline. Candidates are encouraged to consult with Examination Committee members regarding the form, content, and expectations of the written papers.

To facilitate this process, the identity of primary and secondary readers for each topic will be indicated to the candidate at the time that the topics are received. Candidates are also encouraged to refer to Comprehensive Examination essays done by former students. It is also useful to consult graduate students who have recently passed the Comprehensive Examination for advice.

- **Oral Comprehensive Examination**

  a. The candidate will be examined orally by the Examination Committee after passing all parts of the written one, on a date determined by the committee.

  b. Oral exam duration for main and sub specialization (where applicable) is a minimum of two hours.

  c. In the event of failing this exam, a student shall be given another chance the following semester: a second failing would terminate the student from the program.

The examination will stress lateral thinking and factual knowledge related to the essay topics, the candidate's discipline, and general topics in civil engineering. The candidate's level of knowledge in their general discipline will be assessed by all members of the Examination Committee during the course of questioning. Candidates are advised to expect some questions relating to the examination topic for which the candidate chose not to provide a written essay.

In addition, the candidate should be prepared to answer questions relating to the candidate's field of discipline, and general topic. When answering questions from the Examination Committee candidates are advised to begin with the basics and then develop the answer to a more advanced level of knowledge. Examination Committee members may interrupt an answer if the candidate clearly has a detailed knowledge of the subject matter, since one purpose of the examination is to identify apparent deficiencies in the candidate's knowledge.

3.5. Eligibility Requirements for the Comprehensive Exam

Students must meet the following criteria to sit for the comprehensive exam:

1. Students may sit for the comprehensive exam after successfully completing the first semester and core courses—determined by the department/program—of the study plan, with the approval of the department/program and the college. Students should not register for any courses in the semester of the comprehensive exam, except for the "Research Plan Preparation" course.
2. The student must complete the comprehensive exam application form provided by the Graduate studies Deanship's office.

3.6. Procedures for Appealing the Comprehensive Exam Result

Appeals regarding the comprehensive exam results are reviewed based on the regulatory guidelines for academic and educational affairs, as outlined in this article and its executive rules.

The Graduate Studies Council, or its delegate, is responsible for establishing additional regulations and procedures to address student appeals related to the comprehensive exam.

The Graduate Studies Council, or its delegate, will review comprehensive exam appeals in accordance with the provisions of Articles 64, 65, 66, and 67 of the regulatory guidelines for academic and educational affairs.

4. Theses Proposal and Dissertations

- A graduate student at the master's or doctoral level, after completing at least 50% of the program's course credits with a cumulative GPA of no less than "Very Good," may register for the course "Thesis Proposal Plan" for one credit hour. The course number and code should correspond to the specific study plan for each program, and its procedures are organized according to the following regulations:

- The student may register for the course for one semester in the case of a master's degree (coursework and thesis system) and for a maximum of two semesters for a doctoral degree. During this period, the student must complete their research plan and submit it to the department/program.

- An extension may be granted, as an exception, for one additional semester upon the recommendation of the department/program council and the college council, based on a report from the student's advisor outlining the reasons, and with the approval of the Deanship.
- The student is considered to have passed the course after the research plan is officially approved by the Deanship, provided they have also passed the comprehensive exam. A grade of "Pass" (ND) will be recorded, and a supervisory committee for the thesis will be formed in accordance with articles (46, 47, 48). In case of an extension, a grade of "In Progress" (M) will be recorded.
- Passing this course is a prerequisite for the student to register for the thesis course.
- The course must be taught by faculty members who meet the supervision eligibility criteria as outlined in Article (46) of these regulations.
- The faculty member teaching the course will also serve as the student's thesis supervisor after the research plan is approved.
- Article 43: The Graduate Studies Council is responsible for setting regulations for the "Project/Graduation Research" course, with the following considerations for student registration:
- If the student fails to complete the course requirements in the first attempt, a grade of "In Progress" (M) will be recorded, and the course must be registered again in a subsequent semester.
- If the student does not complete the course requirements in the following semester, a grade of "Incomplete" (L) will be recorded to allow the student to complete the course requirements without re-registering.

- If the student fails to complete the course requirements under these conditions, a grade of "Fail" (H) will be recorded.
- The above provisions are implemented based on the recommendation of the department/program council and the approval of the college council. The Deanship is notified to complete the required administrative procedures.
- Doctoral dissertations may be written in one of the following formats:
  1. A comprehensive, integrated scientific thesis.
  2. A collection of coherent and interrelated research papers based on the approved research plan, provided that these papers are published in peer-reviewed scientific journals.

5. Supervisor Section (Committee)

Each graduate student should, at start of enrolment in a program, have an academic guide to direct the study, assist in selecting a thesis topic and preparing a research plan according to University Council regulations initiated by Deanship of Graduate Studies. The student should submit (where applicable) a thesis proposal to the department.

The procedure is permissible after meeting all admission requirements and completing at least fifty percent of the course work with a cumulative average of at least "Very Good." Once it recommends a proposal for approval, the Department Council should name a supervisor (and an Assistant Supervisor where applicable) of the thesis.

In cases that require a Supervisory Committee, the council should name committee members and specify a chairman. College Council's approval of all previous procedures is necessary before ultimate approval by Graduate Studies Deanship Council.

Master's theses subjects should be characterized by novelty and originality, doctorate dissertations by originality, innovation and active contribution to the development of knowledge in the student's discipline. Master's theses and doctorate dissertations should be written in English.

It is permissible to have some written in a different language in certain disciplines on the recommendation of respective Department and College Councils, the Graduate Studies Deanship Council and the decision of the University Council, provided that an abstract in Arabic is supplemented to the thesis.

If a student is found to lack seriousness during the thesis/dissertation phase, based on the supervisor's report, the student will be issued a warning letter from the department/program. If the student is warned twice and fails to address the reasons for the warnings, their enrollment may be terminated, based on the recommendation of the department/program and college councils, with the following considerations:

- The warnings must be issued during two separate semesters, and each warning must be promptly communicated by the college to the Deanship.
- The request for the student's enrollment termination will be submitted by the college to the Graduate Studies Council or its delegate, in accordance with Paragraph (2) of Article (32) of these regulations.

5.1. Supervisors Selection

The thesis should be supervised by Professors and Associate Professors of the University faculty members. Assistant Professor, may supervise Master's theses only on having published (or obtained acceptance for publication of) ***two research items*** (in student's area of specialization) in a refereed academic journal. The assistant professor may supervise doctoral dissertations after ***two years*** of being appointed as an assistant professor, provided they have ***three research papers*** in their area of specialization, published or accepted for publication in peer-reviewed scientific journals after obtaining their doctoral degree.

Thesis and dissertations may be supervised by outstanding and highly competent experts in the field of scientific research who are not necessarily teaching faculty members of the University, on the recommendation of respective Department and College Councils, the Graduate Studies Deanship Council and the decision of the University Council.

Qualified individuals with expertise in the field of research topic may supervise or assist in supervising theses and dissertations, even if they are not university faculty members. This applies to both internal and external supervisors and is subject to the recommendation of the department/program council and the approval of the college council. The following conditions must be met:

A. Supervisor Qualification for Master's Thesis:

a) Have a doctorate degree.

b) The individual must specialize in the topic of the student's thesis.

c) Have held the degree for at least two years.

d) Have at least three items of research (in the student's area of specialization) published or accepted for publication in a refereed academic journal.

e) Approval from the individual's employer to supervise the student's dissertation.

B. Supervisor Qualification for Doctorate Dissertations:

a) Have a doctorate degree.

b) Have held the degree for at least four years

c) The individual must specialize in the topic of the student's dissertation.

d) Have at least six research items (in student's area of specialization) published or accepted for publication in a refereed academic journal.

e) Approval from the individual's employer to supervise the student's dissertation.

A supervisor, whether working individually or jointly with others, may supervise a maximum of seven theses/dissertations at any given time, provided that no more than four of these are doctoral dissertations for which the supervisor is the primary advisor. The Graduate Studies Council may grant exceptions to this limit, based on the recommendation of the department and college councils. Thesis supervision counts for Master as one credit hour each in faculty members teaching loads (when individuals or main) and two credit hours for doctorate supervision as main supervisor and one credit hour for co-supervisor.

If the supervisor cannot continue, or his service in the University comes to the end, a substitute is proposed by the Department Council, approved by the College Council and authorized by Graduate Studies Deanship Council. The contribution of the former supervisor should be accredited in the thesis.

The supervisor should, at the end of each semester, submit a detailed report to Head of Department on the students' progress in the study, a copy of the report should be sent to the Dean of Graduate Studies. Once the student's completion of the thesis, the supervisor should submit a Report to the Head of the Department to announce this and declare thesis suitability for discussion. The report must include a copy of the thesis/dissertation, an originality report, and a similarity index report signed by the student, as a prerequisite for initiating the defense procedures. The act comes as a prelude to the rest of the procedures specified by the Graduate Studies Deanship Council, namely:

a. The College Council proposes (upon the suggestion of Department Council) the thesis Judging Panel in accord with Items (LV), (LVI) of the Unified Law Organizing the Graduate Studies in Saudi Universities.

b. Names of panel members should be forwarded to the Graduate Studies Deanship Council, for approval, within a period not exceeding one month from the date of the College Council's decision.

c. Following the Graduate Studies Deanship Council's approval of panel members, the Head of relevant Department forwards thesis to members and sets a date for defense.

d. Thesis defense should be conducted in public, but might be done, at the discretion of the department, in private when necessary; the verdict is immediately pronounced after the defense.

e. In case the thesis proves entirely unsuitable for defense, the Deanship of Graduate Studies must be notified to terminate the student's enrolment, in compliance with

Clause (9) of Item (XXVI) of the Unified Law Organizing the Graduate Studies in Saudi Universities.

f. The time limit between the Graduate Studies Deanship Council's approval of the Judging Panel and the date of the defense should not exceed four months; public holidays do not count within this period.

If the student is proven not to be serious in study or neglectful of academic obligations, the student then, based on a report by his supervisor, shall be warned in a letter from the department. If the student is warned twice but does not rectify the situation, the Graduate Studies Deanship Council, on the commendation of the Department Council, may terminate his enrolment in the program.

The time limit between approval of thesis proposal by the Deanship of Graduate Studies and submitting a completed thesis to the department should be minimally two semesters for a master thesis and four for a doctorate.

5.2. Defense Committee

Procedures and performing of committee:

1- A committee for the dissertation defense is formed by a decision of the Graduate Studies Council, based on the recommendation of the College Council and the proposal of the Department Council, with the following conditions:
   - Master's and doctoral students must have completed all coursework and passed the comprehensive examination (if applicable).
   - The student must be officially enrolled in the dissertation course during the same semester.

2- For the formation of a doctoral dissertation defense committee, the student must have published a research paper in a peer-reviewed scientific journal, adhering to the following criteria:
   - The research paper must be published in a journal indexed in recognized scientific databases such as the Web of Science.
   - The paper must align with the approved research plan for the doctoral dissertation.
   - The research must have been published while the student was enrolled in the doctoral program.

- The research must be original.
- The student must be the first author of the paper.
- The paper must indicate the student's affiliation with the university.

3- After the College Council approves the formation of the dissertation defense committee and the Deanship endorses it, the graduate studies coordinator in the department will send the dissertation to the committee members. The defense may not take place until at least one week after the Deanship uploads the dissertation to the electronic portal.

4- The period between the Graduate Studies Council's approval of the committee formation and the defense date must not exceed three months. This period is included in the official timeline for obtaining the degree, excluding the summer vacation.

5- The primary supervisor must complete the form to determine the defense date. A copy of the form, once approved by the department is sent to the college dean.

6- The department must announce the defense date at least one week in advance in designated locations within the department and college, as well as through other available channels, with notification sent to the Deanship.

7- Dissertation defenses are public and conducted in person. Exceptions may allow for a private defense if required. Remote participation is permitted for committee members affiliated with universities or institutes outside Saudi Arabia, subject to a College Council decision based on the department recommendation.

8- The committee's decision is issued immediately after the defense.

9- If at least two-thirds of the dissertation defense committee members determine that the dissertation is not suitable for defense prior to the scheduled defense date, a detailed report outlining the justifications and reasons must be prepared. The report is submitted, based on the recommendation of the department and college councils, to the Graduate Studies Council or its delegate to request the termination of the student's enrollment in accordance with Clause (d) of Paragraph (2) of Article (32) of Graduate studies regulations.

10- The defense cannot proceed or begin if the committee is incomplete. The committee coordinator must notify the department chair to schedule a new defense date. A new request to determine the defense date must be submitted and approved by the department chair and the college dean, with the Deanship being informed accordingly.

11- If a member of the defense committee withdraws, a replacement member must be nominated based on the proposal of the department council and the recommendation of the college council, accompanied by a justification for the withdrawal. The nomination is subject to the approval of the Graduate Studies Council.

Selection of committee

Members of the committee must meet the eligibility requirements for supervising theses, and the majority of the committee members must belong to the department/program to which the student is affiliated.

Thesis Judging Panel is set up by the Graduate Studies Deanship Council on the recommendation of respective Department and College Councils. The following is required in the judging panel for a master thesis:

a. Its members should be odd in number, and the supervisor should be chairing it.
b. The committee must consist of three members from the university's faculty for master's
c. The minimal number of the panel is three teaching faculty members; the supervisor and assistant supervisor (if any) should never form a majority in the committee.
d. For master's defenses, at least one committee member must hold the rank of **professor** or **associate professor**.
e. Conditions for thesis supervisors do apply to the judging panel members.
f. A professor, or an associate professor, should at least be among committee members.
g. Decisions are made through consensus of, at least, two-thirds of its members.
h. There must be no co-authored publications between the examiner and the student during the student's enrollment in the master's or doctoral program. **The supervisor and co-supervisor (if applicable) are exempt from this condition.**

The following is required in a judging panel for a doctorate dissertation:

a. Its members should be odd in number and the supervisor should be chairing it.
b. The committee must consist of five members from the university's faculty members

c. The supervisor and co-supervisor (if applicable) must not form the majority of the committee.

d. Its membership should be exclusive to professors and associate professors; the supervisor and assistant supervisor (if any) should never form a majority in the committee. For doctoral defenses, at least three committee members must hold the rank of **professor** or **associate professor**

e. One of the committee members, at least, should be a full professor.

f. One of the committee members, at least, should come from outside the university.

g. The external member must have no current or past affiliation with the university, must not have earned their doctoral degree from the university, and must not belong to the same workplace as the student.

h. Decisions are made through consensus of, at least, two-thirds of its members.

In the event of thesis supervisor's inability to participate in the judging panel (due to death, retirement or a long-term task assumed outside the country), the department proposes a substitute to be approved by the College Council and authorized by the Graduate Studies Deanship Council.

Committee decisions

The Judging Panel issues a report to be signed by all members and processed to Head of Department within one week from the date of the defense. The report should include one of the following recommendations:

a. Accepting the thesis and recommending degree awarding.

b. Accepting the thesis with some amendments, but no further defense. A member of the panel shall be authorized to recommend degree awarding on ascertaining that amendments are made. Amendments should be completed within a period not exceeding three months from date of defense. However, the University Council may exceptionally permit time extension on the recommendation of the Graduate Studies Deanship Council and the judging panel report.

c. Require rectifying of deficiencies in thesis and another defense within a time limit (not exceeding in length one year from the first) to be specified by the Graduate Studies Deanship Council on the recommendation of relevant Department Council.

d. Not accepting the thesis.

Each member of the judging panel has the right to present different views or reservations in a detailed report to both Head of Department and Dean of Graduate Studies within a time limit not exceeding two weeks from the date of the thesis defense. Head of related Department forwards panel's report to the Dean of Graduate Studies within a time limit not exceeding three weeks from the date of the thesis defense. The Dean of Graduate Studies forwards recommendations of degree awarding to the University Council for approval.

A master degree supervisor from outside the university shall be paid a single reward of five thousand Riyals, and a doctoral degree supervisor from outside the university shall be paid a single reward of seven thousand Riyals.

A committee member participating in the judging panel of a master thesis or doctorate dissertation is paid a single reward of one thousand Riyals (on being a teaching faculty in the same university to which thesis is submitted). University personnel (non-teaching member) and participants from outside the university are paid a single reward of two thousand Riyals for a doctoral dissertation and one thousand five hundred Riyals for the master. Panel members from outside the Kingdom receive three thousand Riyals.

If the external examiner attends from within Saudi Arabia but outside the city where the university is located, they will receive an additional fixed allowance of one thousand five hundred Saudi Riyals in addition to the above honorarium.

If the external examiner attends from outside Saudi Arabia, they will receive an additional fixed allowance of three thousand Saudi Riyals to cover visa, travel, and accommodation expenses, in addition to the above honorarium.

6. Policies and Rules

6.1. Academic advisor

- Each graduate student, from the start of their enrollment in the program, will be assigned an academic advisor from the faculty members of the department, holding a rank no lower than Assistant Professor. The advisor's role is to guide and support students academically to minimize any challenges in their academic journey.
- The graduate studies coordinator in the department, in coordination with the department, is responsible for assigning academic advisors. The Deanship oversees and ensures the implementation of this process.
- Every graduate student at the master's and doctoral levels is required to complete a course on academic integrity, citation rules, and proper use of sources and references during their first semester in the program. This course is conducted under the supervision of the Deanship and in coordination with relevant university entities.

6.2. Duration of study

a. The Maximum duration of study is 4 years for master students and five years for Ph.D. students.

b. Student should register a minimum of two courses per semester (min. 6 hr)

c. The supervisor should send a report every semester about the status and the progress of his student.

6.3. Drop and Postponement

A. Admission Postponement

The Graduate Studies Coordinator in the department and Department may approve postponement of students' admission into a program before the issuance of their university ID number for a maximum period of two semesters in accordance with the timeline set by the Deanship and the regulations established by the Graduate Studies Council; the period will not be counted within the time limit for obtaining the degree.

B. Registration Postponement

Based on Graduate Studies Coordinator recommendation and Department Councils, College Deans and the Dean of Graduate Studies may approve postponement of students' registration under the following condition:

a) The student must have successfully completed at least one semester in the program or covered a substantial part of the thesis.

b) The time limit of postponement should not exceed two semesters (one year of study).

c) The total duration of postponement and withdrawal must not exceed **three semesters**.

d) Requests for postponement should be submitted at least two weeks before the start of the semester and according to the timeline set by the Deanship.

e) Postponement Period will not be counted within the maximum time limit for obtaining the degree.

f) Defer the application, applicant should have a reasonable excuse to defer or change the start date of study (Like visa issue, family issue….)

C. Drop of Courses

a) A drop of courses will not be entertained after the announced registration dates are over. Some consideration could be given to the students within one week of the beginning of classes to drop the course.

b) A student registered in a program will not be able to add or drop a course on the second week of the program in the University unless he has obtained the permission from the Head of Department responsible for the program.

c) If a student decides to drop a course at the beginning of the second week, it will be called a withdraw instead of drop courses. The maximum number of courses that student can withdraw during his program will be only two courses.

d) Withdrawal requests must be submitted and approved according to the timeline set by the Deanship of Graduate Studies.

e) The total number of credit hours registered by the student after the withdrawal must not be less than three credit hours for regular students, and six credit hours for scholarship students.

f) The maximum number of courses that student can withdraw during the whole program period will be only two courses .

g) Students are not permitted to withdraw from any prerequisites courses.

h) If a student withdraws from a course, the department is not obligated to offer the course in the following semester.

D. Drop of a Semester

The student may (after registering) drop all courses of the semester according to the following regulations:

a) Submit a request to the Head of the Department based on the recommendation of the graduate studies coordinator in the department at least five weeks before the final exam period and according to the timeline (Calendar) set by the Deanship of Graduate Studies.

b) The student should receive approval from the Department Council and Deans of both College and Graduate Studies.

c) Semester should not be part of the additional opportunity period.

d) Semester counts as part of postponement period.

e) Students are not permitted to withdraw from any remedial courses or prerequisites.

f) The student shall be considered as having failed all courses he registered in (in the dropped semester) if not abiding by the above rules of dropping.

g) Dropping semesters are not counted toward the maximum duration allowed to complete the degree.

However, master's and doctoral students cannot withdraw or postpone more than three semesters during their program of study.

6.4. Withdrawal and Interruption

A. Withdrawal

A student who voluntarily withdraws from a master program will be treated as a new applicant on deciding to rejoin. All updates of conditions will be applied to his case. The withdrawal becomes effective when accorded with the following regulations:

a) The student should apply (for withdrawal) to the Deanship of Graduate Studies before the commencement of final exams.

b) The Deanship of Graduate Studies ought to notify both the Deanship of Admission and Registration and the relevant department of a student's withdrawal in two-week time from the date of completion of withdrawal procedures.

B. Interruption of Study

The student shall be considered as a dropout and his record as closed in the following cases:

a) If accepted in the program and did not register on time.

b) If registered in the courses and did not attend them.

6.5. Transfer between Disciplines

a. Transfer of student from one discipline to another would be restricted within the acceptance of both disciplines involved. Disciplines will decide on the basis of their criterion to allow the transfer.

b. A graduate student can transfer from the non-thesis program to the thesis program if the student gets approval from one of the faculty to be his supervisor.

c. Local graduate Students are allowed to transfer from thesis program to non-thesis program.

d. International graduate students are allowed to transfer from the thesis program to non-thesis program excluding students that have a scholarship from King Saud University to pursue their degree.

6.6. Graduate Students Evaluation

Examinations for graduate courses and the recording of grades are conducted in accordance with the organizational regulations for undergraduate academic and study affairs, with the following exceptions:

1. A student is considered to have passed a course only if they achieve a minimum grade of **"Very Good"** or higher.
2. A student must achieve a minimum grade of **"Very Good"** in remedial or supplementary courses.
3. The College Council determines appropriate measures for alternative assessments and courses requiring study over more than one semester, based on the recommendation of the Department Council.

4. The student graduates after successfully completing all graduation requirements of the program, provided their cumulative GPA is not less than **3.75**

These procedures must comply with specific organizational regulations for graduate academic and study affairs, as approved by the Academic Council, based on recommendations from the Graduate Studies Council.

7. Policies and procedures for dealing with academic dishonesty and plagiarism

Academic dishonesty (plagiarism, fabrication, or falsification of data) is a breach of the ethics and a violation of one of the central norms of an academic community. Because reports of academic dishonesty are most likely to arise from work done in a course or for a divisional project, a member of the college faculty usually brings forward the report.

Dishonesty: Copying copyrighted materials for sale or unlawful distribution or purchase of such materials by others without receiving the appropriate publisher's approval; unauthorized entry into, unauthorized use of, or issue of university property, including computers and data and voice communication networks; unlawful copying of computer software; misrepresentation of personal circumstances to an instructor to gain personal advantage (e.g., requesting a makeup exam or special due date for an assignment); taking credit for participating in a team research effort or an assignment when little or no contribution to the work has been made.

Cheating: Using unauthorized notes, aids, or information obtained from sources other than those allowed by the instructor while sitting for an exam graded work or exams; knowingly providing or receiving unauthorized information during examinations, or the possession and/or use of unauthorized materials during those examinations; trying to falsify any part of an examination or classwork that would represent learning by any other person than the exam taker. Cheating includes obtaining copies of examinations or homework beforehand (if not permitted), trying to take someone else's exam, or trying to have someone else take one's own exam.

Plagiarism: Submitting a written document (homework, term paper, research findings, publication, etc.) that in part or in whole is not one's own work, whether it be a quotation, an opinion, an idea obtained through conversation or reading, a fact, or research findings, without giving proper attribution through a citation specifying the source of information.

Fabrication: Falsifying laboratory or other data or citations; presenting data gathered outside of acceptable professional guidelines; failing to provide an accurate account of how information, data, or citations were gathered; forging signatures or falsifying an academic document, grade, letter, form, ID card, photograph, or any other documents or electronic medium.

When such a report is brought forward, the procedure is as follows:

- The faculty member will inform the student and the vice dean that a violation of academic honesty may have occurred. The vice-dean will inform the dean of advising of the violation. The faculty member will provide all documentation to the vice dean of advising, who will meet with both the student and faculty member, and recommend a course of action. If the vice dean of advising determines that it is more likely than not that academic dishonesty has occurred and determines that it is a first offense, the vice dean of advising will: Write a letter of warning to the student, to remain in the student's academic file. In consultation with the faculty member and the vice dean, determine academic consequences that may include.

  https://sa.ksu.edu.sa/ar/node/4436 [Arabic]
  https://faculty.ksu.edu.sa/sites/default/files/lyh_tdyb_ltlb_2020_md_shwwn_ltlb.pdf [Arabic]
  https://dsrs.ksu.edu.sa/sites/dsrs.ksu.edu.sa/files/imce_images/aklaqyat-sfar-1437.pdf [Arabic and English]

8. Codes of conduct, including academic integrity policies, disciplinary procedures

The Student Code of Conduct represents a set of principles of professional conduct, rules and responsibilities by which all students must aspire to fulfill their duties to the patients, the public, the profession, their teaching faculty, the staff, their peers and research conducting. The Code of Professional Conduct identifies the basic moral commitments and serves as a source of education and reflection. It outlines specific behaviors that are expected from all students, in King Saud University-College of Engineering, in all educational and public settings. This Code applies to behavior during presence in College of Engineering and when representing College of Engineering in public. It shall be the responsibility of each student to become familiar with the provisions of this Code. Upon enrollment at KSU- College of Engineering each student will be given a copy of the Code and will sign a form acknowledging that students have read, understood and agreed to follow this Code. Misconduct casts doubt on the integrity of individuals and their institutions, and deemed to be in violation of the Code.

PRINCIPLES OF CODE OF CONDUCT

- The following principles are the foundation of the Student Code of Conduct. All students are required to be aware of and act consistently with the following values:
- Respect the dignity, professional status of, and professional relationships with their fellow students, teaching faculty, staff and other healthcare providers.
- Cultivate an environment whereby differences in perspective, experience and culture are recognized and valued.
- Maintain a cooperative and collaborative approach to inter-personal relationships.
- Act honestly and ethically in their dealings with University employees, consultants, fellow students, and any other members of the public.
- Maintain appropriate standards of accuracy, reliability, credit, honesty and confidentiality in all research and learning activities.
- Show consideration and respect for all components of and individuals associated with the research process.
- Respect the general resources and physical property of the University.

The Deanship for Development and Quality at College of Engineering has a unit responsible for students' right and protection; in addition, a booklet is available from the unit.

https://engineering.ksu.edu.sa/en/Quality_Policy [English]

Where other university rules are available in the following university website:

https://sa.ksu.edu.sa/ar/rules [Arabic]

https://sa.ksu.edu.sa/ar/commitments [Arabic]

https://sa.ksu.edu.sa/sites/sa.ksu.edu.sa/files/attach/lwthyq_wlqwd_njlyz_0.pdf [English]

9. Academic requirements for remaining in and graduating from the program,

Requirement for graduating from the M.Sc. and Ph.D. program

- According to article e XXXIII from unified regulation of graduate studies:

The study for a master's degree shall be possible through one of the two following tracks:

1. The course/thesis track (minimally twenty-four hours of graduate courses plus a thesis).
2. The course track (in some disciplines of vocational nature, provided that study units are no less than forty-two hours of graduate courses including a three-unit research project). The study plan for a master's degree shall include, wherever possible, graduate courses related to other disciplines.

- According to Article XXXIV from unified regulation of graduate studies. The study for a doctorate degree is possible through one of the two following tracks:
  1. The courses-thesis track: at least thirty credit hours of graduate, post-master's degree courses in addition to the thesis but this option are not available in Civil Engineering Program.
  2. The courses-thesis track: at least twelve credit hours of graduate courses of independent studies and seminars correspond with the student's academic interests and specialization, in addition to the thesis.

- The student shall graduate when he completes all degree requirements with a cumulative GPA of no less than "Very Good."

- According to Article XXXVI from unified regulation of graduate studies
  1. The requirements of a master's degree can be completed in a period no less than four semesters, and no more than eight semesters. Summer semesters shall not be included.
  2. The requirements of a doctorate degree can be completed in a period no less than six semesters, and no more than ten semesters. Summer semesters shall not be included.

https://graduatestudies.ksu.edu.sa/sites/graduatestudies.ksu.edu.sa/files/imce_images/llyh_bllg_lnjlyzy.pdf [English]

10. Academic advising

At the university level, the Deanship of Student Affairs has established counselling and guidance units for students, *(*Visit*: https://sa.ksu.edu.sa/ar/ccg)* in order to:

1. Help students to understand their problems difficulties.
2. Help students to recognize their own abilities and potential.
3. Assist students to understand what resources are available to them and how to make best use of it including central library facilities, LMS and edugate systems.
4. Solve problems regarding academic achievement.
5. Solve psychological and/or social problems that might hinder academic achievement.

At the CED level, student council committee (SCC) and Mentoring and Directing Unit (MDU) provide academic advice to the students during their study. Student support is available through the interaction with the MDU, in which part of its tasks is to meet students who might be having social/financial/psychological problems that may affect their performance and help them to overcome these problems. In addition, it advices students whether as fresh students in the department or when they reach the level to select their specialty track. MDU also invites speakers from industry to inform students about the job market and future career. The Unit also organizes an appreciation event for distinguished students where they meet with the Dean and are awarded special prizes for their achievements. Also, a special seminar is arranged for final year students to orient them on the issue of choosing their specialty and different career and employment opportunities. CED is in the process to activate an academic advisory system, where each student at the civil engineering department is assigned to a faculty advisor (FA). The FA is expected to advise students in planning their academic programs. The FA has the following main roles:

1. Advice and help students in their registration.
2. Provide students with clear guidance in dropping and adding courses and in improving their academic performance.
3. Ensure that the students understand the academic regulations and follow their academic programs in a sequential order.
4. Follow-up students' academic progress, especially those at risk.

To ensure adequate confidentiality in providing support and advice to students, MDU, FA, chairman and vice dean for academic affairs are the only responsible parties about the student's academic or personal issues. To ensure continuous student satisfaction on all provided services,

several surveys are conducted each semester to evaluate the student satisfaction about the quality of provided services within the Civil Engineering Program. Among those surveys are; Student Course Evaluation Survey (CES), Student experience Survey (SES), and Program Evaluation Survey (PES).

a. http://sa.ksu.edu.sa/ar/ccg [Arabic]

b. http://sa.ksu.edu.sa/ar/Youradvisor [Arabic]

c. https://sa.ksu.edu.sa/ar/node/927 [Arabic]

https://sa.ksu.edu.sa/ar/node/4338

11.Career guidance

Engineering graduates usually find suitable jobs upon their graduation. These jobs include joining academic areas in universities, research centers, public education, private companies, Ministry of Education and in many other government or private organizations. However, Proceeding from the fifth strategic objective of the College of Engineering: "Establishing strong ties, and continuous and fruitful collaboration with industrial, services, commercial, governmental and other societal sectors and institutions", the college, based on its beliefs of the importance of building career relations that contribute to developing community-based partnerships as a basis of building an intellectual community, is currently seeking to strengthen its ties to its alumni, as well as supporting their role in community development, taking advantage of their expertise in developing and advancing the college's progress, exchanging knowledge and experiences amongst alumni, and offering academic and scientific support in their practical endeavors. To achieve this, the "Alumni and Employment Unit" has been established at the College of Engineering's Vice Deanship for Development and Quality. The college is aspired through this unit to create a continuing communication channel with its alumni and strengthen their association to the college and university, as well as contributing to providing diverse career opportunities for them and exhorting them to supporting and assisting in various college and community services. The one of the major objectives of the Alumni and Employment Unit are centered on providing services related to alumni, career services, and graduation projects such as:

- Offering various services to the college's new alumni that would assist in developing their skills and directing them towards available job positions.
- Taking advantage of the experience acquired by alumni working in consultancy services in developing college programs and activities, as well as in coping with development plans, job market demands, and employment.
- Advertising and regularly updating available job opportunities for alumni via the Web Site.
- Developing an information database for companies to facilitate communicating with the college's alumni and creating accounts for them on the unit's Web Site.
- Assessing the needs and opinions of companies regarding employment through electronic surveys completed on the unit's Web Site.

https://engineering.ksu.edu.sa/en/Alumni-Unit [English]

https://coeksu-alumni.net/en [English]

12. Psychological counseling.

The Student Guidance and Counseling Unit at dean of students affairs provides preventive and services that lead primarily to creating the appropriate conditions for achieving the normal growth of students and building positive social relations for the student with his colleagues, faculty members and university employees, as well as building successful responses in addressing the problems he encounters in the various situations that arise through his daily interaction in addition to therapeutic services to deal with behavioral disorders, emotional problems, compatibility problems and others in cooperation with King Khalid University Hospital (represented by psychiatric clinics). The unit also provides group therapy sessions through which the developmental aspect of students can be activated.

This area of the Deanship provides services to the students who need social and psychological guidance via offices in building NO. 17 in the university central campus. There are specialized and trained psychiatrists and sociologists. Services include:

- Short term psychiatrists.
- Solving familial and social problems.
- Social and ecological treatments.
- Psychological treatment and guidance.
- Behavioral Treatment.
- Cooperation with other university hospitals for treating sick students.
- Follow up with educational obstacles.
- Psychological measuring.

These are the following procedures for students counseling:

- Among its most important tasks is the study of the psychological and social status of the student, the application of psychological tests and measures, the solution of some behavioral and material problems of students, and the follow-up of students who stumble academically.
- Assign a responsible person for the troubled student care program.
- Determining the criteria for default (lower average, repeated absences, duration of study, repeated omissions, student behavior in the hall, etc.).
- Counting troubled students.
- Call the students to meet them individually.
- Diagnosing the failing student.

- Sorting out cases of stumbling (academic, psychological, social, economic, etc.).
- Addressing the academic problems of each student.
- Referring other cases of stumbling to the student guidance and counseling center at the university (academic, psychological, social, economic, etc.).
- Follow up the case after transferring it with the center.
- Close the case after it ends.
- Submit a final report on the results of academic failure in the college.

https://sa.ksu.edu.sa/ar/node/4110 [Arabic]

https://sa.ksu.edu.sa/sites/sa.ksu.edu.sa/files/imce_images/lyh_mrkz_lwjyh_wlrshd_ltlby_0.pdf [Arabic]

https://sa.ksu.edu.sa/sites/sa.ksu.edu.sa/files/attach/lwthyq_wlqwd_njlyz_0.pdf [English]

https://sa.ksu.edu.sa/sites/sa.ksu.edu.sa/files/imce_images/lbrmj_wlkhdmt_lrshdy.pdf [Arabic]

13. Study Plan for M.Sc. Program Students

13.1. Study Plans in Civil Engineering Department

a. The M.Sc. degree requirements for **Master-Thesis plan (Plan A)** are as follows:

Completing **26 credit hours** of course work from the approved graduate courses as follows:

- 9 credit hours of common courses, as given in Table 6-A
- 15 credit hours of specialized Civil Engineering courses chosen from one of the areas of specializations mentioned above, as given in Tables 6-B to 6-G according to the applicant's specialization.
- Satisfactory completion of the M.Sc. thesis (2 credit hours).

Program Structure	Required/ Elective	No. of courses	Credit Hours
Course	**Common Courses** (Required for all Specialties)	3	9
	Core courses (Required for each specialty)	4	12
	Elective Courses (selected from the list of elective courses in each specialty)	1	3
Thesis Courses	**CE 596 Thesis Research Proposal**	1	1
	CE 600 Thesis	1	1
Total		10	26

b. The M.Sc. degree requirements for **Master-Non-Thesis (Coursework based) plan (Plan B)** are as follows:

- Passing **42 credit hours** of master's courses including the research project
- General Elective course means that it can be taken from any specialty.

Program Structure	Required/ Elective	No. of courses	Credit Hours
Course	**Common Courses** (Required for all Specialties)	3	9
	Core Courses	4	12

	(Required for each specialty		
	Elective Courses (selected from the list of elective courses in each specialty)	**3**	**9**
	General Courses (selected from any list of courses from any other specialty)	**3**	**9**
Graduation Research Project	**CE 598 Research Project**	**1**	**3**
Total		**14**	**42**

13.2.M.Sc. Program Courses in Civil Engineering Department

Table 6-A. Common Courses

SN	Course Code	Course Name	Credit Hours
1	STAT 503	Probability and Mathematical Statistics	3
2	MATH 505	Numerical Linear Algebra	3
3	CE 572	Computer Applications in Civil Engineering	3

Table 6-B. Courses in Construction Engineering and Management

SN	Course Code	Course Name	Credit Hours
1	CE 511	Construction Planning and Control	3
2	CE 512	Construction Management	3
3	CE 513	Construction Engineering	3
4	CE 514	Decision Making and Risk Management in Construction	3
5	CE 515	Cost Analysis and Control	3
6	CE 516	Construction Engineering Contracts	3
7	CE 517	Computer Applications in Construction	3
8	CE 578	Value Engineering	3
9	CE 510	Construction Management Research	3
10	CE 518	Selected Topics in Engineering and Construction Management	3

Table 6-C. Courses in Structural Engineering

SN	Course Code	Course Name	Credit Hours
1	CE 563	Advanced Structural Analysis	3
2	CE 564	Advanced Solid Mechanics	3
3	CE 565	Theory of Plates and Shells	3
4	CE 566	Plasticity in Structural Engineering	3
5	CE 567	Stability of Structures	3
6	CE 568	Structural Dynamics	3
7	CE 569	Finite Element Method in Structural Analysis	3
8	CE 573	Behavior of Metallic Structures	3
9	CE 574	Behavior of Reinforced Concrete Members	3
10	CE 575	Prestressed Concrete Structures	3
11	CE 576	Structural Reliability	3
12	CE 577	Advanced Concrete Technology	3
13	CE 579	Special Topics in Structural Engineering	3

Table 6-D. Courses in Water Resources Engineering

SN	Course Code	Course Name	Credit Hours
1	CE 501	Design of Hydraulic Structures	3
2	CE 520	Advanced Hydraulics	3
3	CE 522	Groundwater Hydrology	3
4	CE 525	Surface Water Hydrology	3
5	CE 527	Water Resources Planning	3
6	CE 528	Water Resource Systems Analysis	3
7	CE 521	Irrigation Engineering	3
8	CE 502	Hydrometry	3
9	CE 503	Drainage Engineering	3
10	CE 524	Sediment Transport	3
11	CE 504	Numerical Methods in Water Resources	3
12	CE 526	Probability & Statistics in Hydrology	3
13	CE 529	Special Topics in Water Resources & Hydraulics	3

Table 6-E. Courses in Geotechnical Engineering

SN	Course Code	Course Name	Credit Hours
1	CE 581	Advanced Soil Mechanics	3
2	CE 582	Advanced Shallow Foundation Engineering	3
3	CE 583	Retaining Structures and Slopes	3
4	CE 584	Geotechnical Measurements and Exploration	3
5	CE 585	Applied Rock Mechanics	3
6	CE 588	Numerical Methods in Geotechnical Engineering	3
7	CE 586	Offshore Engineering	3
8	CE 589	Special Topics in Geotechnical Engineering	3

Table 6-F. Courses in Environmental Engineering

SN	Course Code	Course Name	Credit Hours
1	CE 506	Environmental Chemistry	3
2	CE 508	Physicochemical Treatment Processes	3
3	CE 509	Biological Treatment Processes	3
4	CE 543	Planning and Design of Water and Wastewater Networks	3
5	CE 544	Environmental Air Pollution	3
6	CE 546	Solid Waste Management	3
7	CE 547	Industrial and Hazardous Waste Management	3
8	CE 507	Environmental Microbiology	3
9	CE 542	Planning & Design of Treatment Plants	3
10	CE 549	Special Topics in Environmental Engineering	3

Table 6-G. Courses in Transportation Engineering

SN	Course Code	Course Name	Credit Hours
1	CE 531	Traffic Flow Characteristics	3
2	CE 532	Advanced Transportation Planning	3
3	CE 533	Advanced Railway Engineering	3
4	CE 534	Traffic Flow Operation and Control	3
5	CE 536	Advanced Geometric Design of Highways	3
6	CE 537	Advanced Pavement Design	3
7	CE 538	Pavement Evaluation and Maintenance	3
8	CE 539	Traffic Safety Analysis	3
9	CE 540	Intelligent Transportation systems	3
10	CE 541	Mass Transportation Systems	3
11	CE 547	Transportation Logistics Planning	3
12	CE 548	Machine Learning and Artificial Intelligent Application in Transportation Systems	3
13	CE 550	Geographic Information Systems Application in Transportation Systems	3
14	CE 551	Statistical Modeling in Transportation	3
15	CE 552	Highway Infrastructure Management	3
16	CE 553	Design and Performance of airport Pavement	3
17	CE 554	Sustainable Transportation Assets Management	3
18	CE 555	Pavement materials and design of Asphalt Mixes	3
19	CE556	Transportation Economy	3
20	CE 599	Special Topics in Transportation	3

Table 6-H. Thesis and Project Courses

SN	Course Code	Course Name	Credit Hours
1	CE 598	Research Project in Plan B	3
2	CE 596	Thesis Research Proposal	1
3	CE 600	Thesis in Plan A	1

The course descriptions and references needed for each course are given in **Appendix A,** while the associated textbooks of all courses are given in **Appendix B**

14. Funding of Graduate Students

14.1.Research Funds from DSR

Graduate Student can apply through Deanship of scientific research by following the below steps.

a. Submit the proposal to the Research Center by filling out the required form and sending it to e-mail: HGDSR@ksu.edu.sa. For more details student should contact deanship of scientific research at http://dsrs.ksu.edu.sa.

b. Attach a copy of t of research plan approval which approved from the Deanship of Graduate Studies

c. The proposal is reviewed and verified by the Research and Finance Support Unit.

14.2.Research Funds from KACST

Student can also apply to The Grants Program for Universities and Research Centers (GPURC) at King Abdulaziz City for Science and Technology (KACST's) through https://www.kacst.edu.sa/eng/srs/Pages/Grants-Program-Universities-Research-Centers.aspx.

14.3.Stipends

Stipends are paid to all Saudi students attending undergraduate and graduate studies and not having in any governmental job, as well as foreign scholarship students and students of Saudi mothers .Stipends are deposited in students' bank accounts, noting that ATM cards are given to them by their respective colleges. The stipend amount is (SR 1000) for scientific studies students,(SR 850) for social studies and humanities students, and (SR900) for graduate studies students.

- Stipends are paid regularly during all the original period, i.e. , the scheduled program period for graduation according to the study plan approved by the University Board. For example, the original period of the Art Faculty is four years. It is calculated as of the semester in which the student is admitted to the university, including withdrawal and transfer semesters , but excluding deferral semesters.

14.4.Book and Reference Allowance for Graduate Students

The graduate student is paid (SR 900)as books and reference allowance for each academic year, (SR 3000)printing allowance for the Master's thesis, and (SR 4000)for the Ph.D. dissertation.

- The book and reference allowance is deposited in the student's account (non-employee) if his/her student number begins with 430 and above. Conditionally, he has registration and grades entered in the same semester. However, the student can receive the allowance from the accountant in his college if his student number begins with 429 and below. As for the graduate student who is employed at King Saud University, he/she can receive the allowance from the Deanship of Personnel.
- The master's thesis and Ph.D. dissertation printing allowance is deposited in the student's account (non- employee) after a grade is entered for him/her in the same graduation semester provided that his status on the academic system is graduated. As for the graduate student who is employed at the University of King Saud, he can receive printing allowance for the above-mentioned printing allowance from the Deanship of Personnel.

14.5.Support for Travel

Every graduate student registered at KSU is eligible to apply for support for research travel from the Graduate Studies Deanship, e.g., to conferences. At present this support is once per program. The Conference Travel Grant forms must be submitted no later than one month before the conference and require the Department and College Approval. Student should apply online through electronic service of Graduate studies website at https://eservices.ksu.edu.sa/ACGS/.

15. Deanship of Graduate Studies

For more information, you are encouraged to visit the Deanship of Graduate Studies to https://graduatestudies.ksu.edu.sa/en

PART C. STUDENT LIFE

Less than 10 km from Center of Riyadh King Saud University campus provides a safe, supportive culture for undergraduate and graduate students alike. We offer a wide range of services to help with housing, academic support, internships and career planning. Diverse and engaged, our community keeps the campus lively with a variety of events, activities, clubs and organizations.

1. Living Expenses

The following costs reflect average living costs for a single person living in Riyadh, Saudi Arabia.

ITEMS	ESTIMATED COST
Housing	*In campus*: Free furnished airconditioned bachelor housing. *Out of campus*: Unfurnished apartment (2BR) 15,000 – 20,000 SR/year
Transportation	Parking is free in campus. Taxi: 1,000~1,500 SR per month
Utilities (Water + Electricity)	*In campus*: Free *Out of campus*: 300 SR
Internet	Free in campus *Out of campus*: 100 SR/ month
Food	250 SR per month in student restaurant at university campus *Outside campus*: 25~50 SR/meal
Entertainment	Free in campus
Books (varies by program)	50% discount for all students
Total estimated living costs	*In campus*: 1,000 SR / student-month *Out of campus*: it depends.

This information has been compiled to provide you with estimates of the costs you may encounter while you're a graduate student at KSU in Riyadh.

2. Student Housing

All students who live on campus have a private room that includes basic furniture such as a bed, chair and desk. The University provides student housing for the total student enrollment in keeping with its policy of being an entirely residential institution. The multi-story student housing consists of furnished rooms, having two beds per room, showers and hygienic facilities. These units are equipped with new facilities of modern design, consistent with the architecture of the University. All the student housing is provided with parking to house student vehicles. All student housing can get free access to theaters, multi-sport leisure centers, parking, swimming pool, and playground. Also, Internet in campus is free of charge for all students.

The student-housing department uses an effective electronic system to manage student accommodation whereby students can submit their applications and execute a number of housing services electronically. In addition, they are kept well informed about available lists of housing, and they can register in the lists announced every semester. Housing off campus is also available, to assist students with finding off-campus housing, Off Campus Programs and Services works with a third-party vendor (real state offices). For more detail: https://sa.ksu.edu.sa/ar/HousingMale


Student Housings in Campus

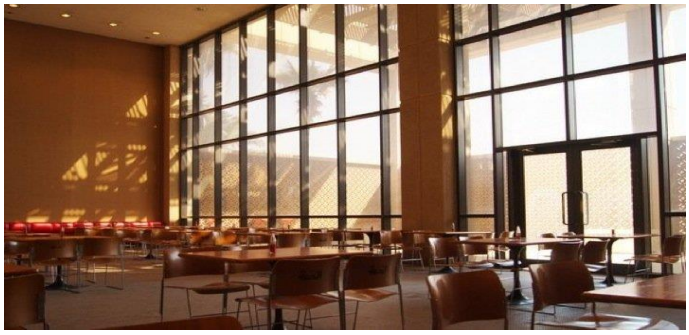
Category A – Single room

Category B – Single or Double Room

3. Dining Options

There are a variety of options for students to dine in and out of campus. In campus, the University Cafeteria offers subsidized meals for breakfast, lunch and dinner that serves all students especially those are living in campus. This Cafeteria is located in a large spacious

building that can accommodate more than 1500 students at a same time. Also, there are many restaurants, cafés, and small markets that are located throughout the campus and offer a wide variety of cuisines and refreshments (sandwiches, home-style food, pizza, ethnic cuisines and more) for both students and staffs. In addition, there are many international cuisine restaurants around the campus. These restaurants can be reached easily using taxi or private car, or by ordering for delivery.



Student Cafeteria in Campus

4. Health Care

All care is free of charge for all King Saud University staff and students at King Khalid University Hospital and King Abdulaziz University Hospital

University Hospitals

5. Campus Safety

While Riyadh is a very safe city to live, work and study, it is always advisable to follow some simple steps that will give you extra vigilance and more peace of mind. Many students and staff also travel extensively in relation to their work with the University.

The campus safety department is the College's authorized security force tasked with enforcing its rules, regulations and policies. Enforcement procedures include issuing parking tickets and summary fines, filing conduct charge sand providing vehicle registration and ID card services.

IMPORTANT PHONE NUMBERS:

- Office: 00966-11-4677837
- Email: secure@ksu.edu.sa

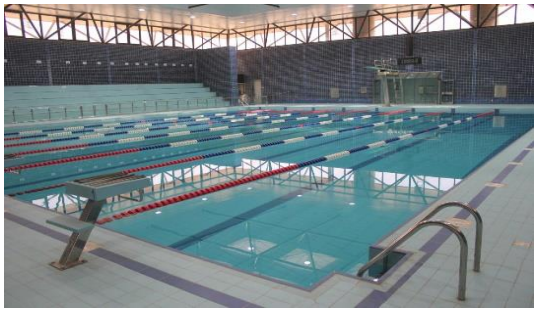
6. Student Activities Department

There is a number of student activity clubs which are supervised by each Department. Students can easily find the student clubs in their disciplines in the University, also they can find clubs for sports, social, cultural and art activities. For the Student Club Activities, the University may provide financial support. The activities of the student clubs focus not only on arranging training courses, scientific & technical visits, scientific competitions, special lectures, exhibitions, cultural exchanges, art, sports activities, but also on representing the University in many seminars, conferences, and forums in the Kingdom and/or internationally. AReserved offices and halls will be allocated for club members.

7. Sports and Recreation Facilities

Each year students are provided an opportunity for fun, fitness, and competition through a wide variety of activities sponsored by the Dean of Student Affairs. Organized team and individual competition for student are offered. Sport clubs are ongoing programs in which students may participate. The University's major sports facility is the Stadium, located near the main entrance to the University. It is designed to seat 25,000 spectators. The Stadium is open and has facilities for VIP seating, press box, and TV booths. It is consistent with the style and construction of all other permanent buildings within the Academic Complex.

Other facilities available for free are: swimming pools, changing rooms, soccer fields, tennis courts, athletics track, basketball and volleyball courts, handball courts, squash courts, and athletic support facilities. And each Colleges have recreation rooms in their buildings for students.




Swimming Pool and Sports Complex

8. Local Attractions

Riyadh is a place that you will surely love. It has lots of things and places for both expats and locals to enjoy. There are different ways to explore this beautiful city. There are numbers of awesome things and attraction places that you may to do in Riyadh city, such

- Sky Bridge at Kingdom Center
- Alfaisaliah Tower
- Wadi Namar and Hanifa
- Tour at the largest integrated farm in the world (Almrai)
- Quad biking at the red sand dunes
- Edge of the world
- Visit the national museum.
- A walk in the past at the historical places (Al Bujairi square, Masmak citadel, old Dir'aiyah)
- Shopping malls (Riyadh Gallery Mall, Riyadh Park, Al-Nakheel Mall, Alfaisaliah Mall et.)

APPENDIX A. COURSE DESCRIPTIONS

1. Common Courses

SN	Course Code	Course Name	Short Description
1	STAT 503	Probability and Mathematical Statistics	The course covers the main concepts of probabilities with some applications. Then it covers the statistical distributions for both types (discrete and continuous). Next, sampling distribution is applied for mean and proportion. Finally, parameters estimate, and some testing of hypothesis methods are used.
2	MATH 505	Numerical Linear Algebra	Linear equations and matrix analysis. Approximation of functions, error analysis. Special matrices, error analysis for linear systems, iterative methods, computation of eigen value and eigen vectors.
3	CE 572	Computer Applications in Civil Engineering	Problem solving programs: Spreadsheet and MATLAB. Mathematical programs: numerical integration, solution of differential and nonlinear equations. Statistical programs: analysis, modeling and testing of data. Logical and optimization programs. Database, artificial intelligence and expert system programs. Applications to all civil engineering disciplines. Project.

2. Courses in Construction Engineering and Management

SN	Course Code	Course Name	Short Description
1	CE 511	Construction Planning and Control	This course provides the students an opportunity to study and apply different planning and scheduling tools and techniques throughout a project's life cycle.
2	CE 512	Construction Management	Advanced study and analysis of construction top and upper-middle management responsibilities, on construction management, construction financing, construction safety, inspection and quality control, and disputes and claims. Stresses investigations to improve construction management efficiency and to lower construction costs.
3	CE 513	Construction Engineering	This course encompasses the technical, economic, and safety issues associated with construction engineering. Specifically, this includes project layout, equipment selection, equipment performance, productivity, economics, and project-specific health and safety plans. The course addresses typical design problems encountered during construction projects as well as quality control, project documentation requirements, and technological innovations that improve productivity or enhance safety.
4	CE 514	Decision Making and Risk Management in Construction	Concepts and current issues surrounding construction project evaluation and financing. The use of decision theory in evaluating project feasibility studies. Decision making under conditions of risk and uncertainty.

SN	Course Code	Course Name	Short Description
5	CE 515	Cost Analysis and Control	Basic principles of cost accounting, financial analysis, and cost control. Integration of scheduling and cost control. Systematic cost control as related to job production and historical data.
6	CE 516	Construction Engineering Contracts	Basics of contract law; types and selection of construction contracts; essentials of plans and specifications; bidding, awarding and administration of contracts; liability, bonding claims, and other legal aspects associated with construction projects.
7	CE 517	Computer Applications in Construction	Microcomputer applications in construction management, planning, scheduling, cost estimate, and risk analysis. Should also gain exposure to the use of expert systems, data bases and other integrated packages.
8	CE 578	Value Engineering	This course provides a comprehensive introduction to Value Engineering (VE), a proven methodology designed to enhance the value of construction projects. Students will delve into the intricacies of the VE methodology, understanding its foundational principles and its pivotal role in informed construction decision-making. As they explore real-world applications on construction projects, they'll gain hands-on experience with VE tools, specifically tailored for project-based evaluations. Beyond mere theory, students will engage in practical exercises to critically analyze projects, ensuring they achieve optimal functionality at reduced costs. By the end of the course, students will be well-equipped to apply the VE method, striking a balance between performance and economy in construction endeavors.
9	CE 510	Construction Management Research	This course covers research methodology applied to the construction industry. Students will have the opportunity to learn the importance of good construction project management and get an introduction to common approaches to construction research, including research strategies and formulation of research questions. They will finish the course by exploring a typical framework for a research proposal and drafting a research proposal of their own.

3. Courses in Structural Engineering

SN	Course Code	Course Name	Short Description
1	CE 563	Advanced Structural Analysis	Energy principles; Stiffness and flexibility matrix analysis of structures; Finite difference method and a brief outline of the finite element method; Linear and nonlinear analysis of frames; Finite element analysis using open-source software.

SN	Course Code	Course Name	Short Description
2	CE 564	Advanced Solid Mechanics	Introduction to elasticity: stress; strain; equilibrium; compatibility; constitutive relations. Selected topics in advanced mechanics of materials: torsion of non-circular solid and thin-wall open and hollow sections; unsymmetrical bending; shear center; shear deformations in beams; curved beams; failure theories; beams on elastic foundations.
3	CE 565	Theory of Plates and Shells	Stresses and deformations in a plate element. Theory of thin elastic plates. Classical solution of rectangular and circular plates. Numerical techniques of Rayleigh-Ritz. Large deflection theory of plates. Stresses and deformations in a shell element. Membrane and bending theories of thin shells.
4	CE 566	Plasticity in Structural Engineering	Fundamentals of theory of plasticity; Inelastic behavior of sections, members and structures; Fundamentals and basic theories of limit analysis; Applications of limit analysis applications to plane concrete and metal structures; Plastic design of continuous beams and frames.
5	CE 567	Stability of Structures	Bending of structural members subjected to axial and lateral loads; Elastic and inelastic buckling of compression members; Torsional and lateral buckling of beams; Local buckling; Instability of frames, plates and shells.
6	CE 568	Structural Dynamics	Vibrations and dynamic response of structures; free and forced vibration, response to foundation excitation. Response spectrum concept. Single-degree & multi-degree of freedom systems with lumped and consistent mass. Seismic design load.
7	CE 569	Finite Element Method in Structural Analysis	Introduction to Finite Element Method; Direct formulation of finite element in one dimension; stiffness method for truss, beam and frame analysis; Weighted residuals; Energy and Variational principles in elasticity; Rayleigh-Ritz method; Shape functions and finite element formulation; Lagrangian and Serendipity elements; Isoparametric elements and Numerical integrations; Finite Element Implementation to 2-D Plane Stress/Plane Strain and Axisymmetric problems.
8	CE 573	Behavior of Metallic Structures	The course covers applications of advanced concepts in the design of steel structures with emphasis on the role of member stability in the analysis and design of steel structures, behavior and design of built-up compression members, behavior and design of plate girders, behavior and design of composite steel beams and columns, as well as behavior and design of bolted and welded connections with different load conditions, according to LRFD method and Saudi Building Code Provisions.
9	CE 574	Behavior of Reinforced Concrete Members	The course is intended to provide in-depth understanding of how reinforced concrete (RC) members behave under imposed loads and deformations starting from basic behavior to how ACI 318-19/ SBC 304-24 design code equations were introduced and derived. Reinforced concrete materials: factors affecting strength and deformability, stress/strain relations, and confinement models. Short and slender members under axial load only or both flexure and axial load: sectional analysis, plastic hinges and ductility of members, and inelastic deformations. Behavior of (RC) members in Shear: sectional design, compression field theories, and Truss analogy (strut-

SN	Course Code	Course Name	Short Description
			and-tie models). Anchorage: bond and development of bars, splices, hooks, mechanical devices, and Structural continuity.
10	CE 575	Prestressed Concrete Structures	Prestressing of statically indeterminate structures, prestressing losses; prestressed concrete slabs; partially prestressed concrete beams; members with unbonded tendons; coordination between design and construction techniques in prestressing. Relevant code provisions.
11	CE 576	Structural Reliability	Common probability models. Principles of structural reliability. First and second order methods. Simulation techniques. Probabilistic models for loads and resistance variables. Probability-based design criteria and Design Codes; quantitative risk evaluation, safety and load factor determination.
12	CE 577	Advanced Concrete Technology	Microstructure of cement paste; Elasticity of concrete, Temperature effects in concrete; Concrete-environment interactions, Time-dependent deformations of concrete: Creep and shrinkage; Special cements, fiber reinforced concrete and polymer concrete systems.
13	CE 579	Special Topics in Structural Engineering	This course deals with special topics in structural engineering which are of contemporary interest.

4. Courses in Water Resources Engineering

SN	Course Code	Course Name	Short Description
1	CE 501	Design of Hydraulic Structures	Recognize different types of hydraulic structures and its importance. Design concrete gravity dams, spillways, dam outlet and energy dissipation structures. The course includes also design cross drainage works, canals, drains, culverts, head works, outlet works, regulators, falls, canal transitions, and flood control structures.
2	CE 520	Advanced Hydraulics	Steady pipe flow theory and computations. Design and analyses of sewer network system. Design and analysis of transmission lines. Design and analysis of distribution networks. Unsteady flow; Gradually varied unsteady flow and Rapidly varied unsteady flow, Transient flow equations and methods of solution.
3	CE 522	Groundwater Hydrology	Introduction to groundwater hydrology; occurrence, storage and supply of groundwater; basic differential equations for flow in confined and unconfined aquifers. Steady and unsteady groundwater wells and hydraulics problems; groundwater recharge; saline water intrusion; groundwater modeling; groundwater in Saudi Arabia.
4	CE 525	Surface Water Hydrology	Introduction to surface water hydrology, hydrologic cycle. Hydrologic Principles. Precipitation, Evaporation, Infiltration and Soil Water Movement. Unit hydrograph, Flood hydrograph computation. flood forecasting and frequency analyses; flood; Hydrologic simulation using HEC-HMS.
5	CE 527	Water Resources Planning	Principles and standards for planning water resources; water uses and water supply alternatives; benefit-cost

			analysis, economic and financial analysis; environmental impact assessment, legal and institutional aspects; elements of project formulation and appraisal, programming water resources investigations.
6	CE 528	Water Resource Systems Analysis	Introduction to system engineering optimization by calculus, linear and nonlinear programming, dynamic programming, simulated annealing, chance constraints modeling, and decision analysis. Applications to water resources problems.
7	CE 529	Special Topics in Water Resources & Hydraulics	Any special topic related to Water Resources and Hydraulics not covered in the courses. The selected topics may cover flood damage assessment, flood control strategies and systems, application of remote sensing and GIS in rainfall runoff modeling. Such topics depend on student interest and faculty expertise.
8	CE 521	Irrigation Engineering	In this course, students will be introduced to the importance of irrigation systems. They will also be introduced to the hydraulic designs of various irrigation structures such as weirs, barrages, cross drainage works, dams, silt ejectors and excluders, earth dams, and canal falls. Various components of head work and head regulators will be discussed in this course.
9	CE 502	Hydrometry	Velocity, discharge, pressure and shear measurement's methods in open and closed conduits. Precipitation and infiltration relationship. Hydro-meteorological data collection and analysis. Measurement of water levels, stage discharge relationships. Collection and analyses of sediment data. -Flow measurement structures. Data acquisition, analysis and interpretation.
10	CE 503	Drainage Engineering	Introduction to land drainage, Water logging problem, quality of irrigation water, reclamation of salt and alkali soils, different layout of surface drainage system, sub-surface drainage, unsteady flow to drains, design of pipe/ tile drainage system, and materials for pipe drainage system.
11	CE 524	Sediment Transport	This course covers basic laws governing sediment-particle fall velocity, particle-size analysis, incipient motion, bed forms, bed load, suspended load, and natural river processes. Classic and modern sediment-transport theories, sediment transport predictors, sediment yield, and reservoir sedimentation will also be discussed.
12	CE 504	Numerical Methods in Water Resources	In this course, the students will be understanding the basic behavior of different numerical methods, their potential and their limitations. Decide for each particular problem, the numerical method that best suits the needs. Develop a critical attitude when interpreting the results obtained with different numerical calculation software. Understanding the properties of numerical methods, convergence and stability. Use and develop numerical methods applied to real problems in the field of Water Engineering.
13	CE 526	Probability & Statistics in Hydrology	Statistical methods in hydrology, probability distribution of hydrologic variables, hypothesis testing and goodness of fit, flood frequency analysis, single and multiple regression analysis, classification of time series, characteristics of hydrologic time series, statistical principles and techniques for hydrologic time series modeling, time series modeling of annual and periodic hydrologic time series (including

			AR, ARMA, ARIMA, and DARMA models), multivariate modeling of hydrologic time series, practical considerations in time series modeling applications.

5. Courses in Geotechnical Engineering

SN	Course Code	Course Name	Short Description
1	CE 581	Advanced Soil Mechanics	Stress-strain relations, elasticity equations, shear strength theories. Principles of effective stress in saturated and partially saturated soils. Classical plasticity theory, critical state concept. Geosynthetics (Types, properties, & function)
2	CE 582	Advanced Shallow Foundation Engineering	Development of design skills in foundation engineering for upnormal soil type and condition, such as foundation on layered soil, sabkha soil, expansive soil , collapsing soil, weathered and fractured rock material.
3	CE 583	Retaining Structures and Slopes	Limit equilibrium and limit analysis methods. Pressures on earth retaining structures. Analysis, design, and construction of retaining structures. Stability of natural and man-made slopes under various loading conditions.
4	CE 584	Geotechnical Measurements and Exploration	Planning and execution of subsurface exploration. Exploratory holes and sampling. Field instrumentation and testing. Generation of field parameters. Interpretation of field data for planning and design. Special laboratory tests
5	CE 585	Applied Rock Mechanics	This course is designed to exposure the student to the applications of rock mechanics in engineering practice and to develop his skills with regard to assessment and evaluation of rock mechanics related projects.
6	CE 588	Numerical Methods in Geotechnical Engineering	Numerical versus analytical solution. Approximation and solution of governing differential equations. Basic principles of finite elements, finite difference, and boundary elements methods. Numerical solutions of typical geotechnical engineering problems.
7	CE 589	Special Topics In Geotechnical Engineering	This course deals with special topics in geotechnical engineering which are of current interest.
8	CE 586	Offshore Engineering	This course explores offshore geotechnical engineering, the marine environment, and sediment behavior. Key topics include offshore site investigation, types of offshore structures, pile and drilled shaft foundations, jacket structures, and geohazards. Students gain advanced skills in analyzing and designing offshore foundations, preparing them for technical and leadership roles in the offshore energy and infrastructure sectors.

6. Courses in Environmental Engineering

SN	Course Code	Course Name	Short Description
1	CE 506	Environmental Chemistry	The course provides comprehensive coverage of the chemistry of natural and polluted waters and on the applied chemistry of water and wastewater treatment. The course covers dilute aqueous solution chemistry of acid-base

SN	Course Code	Course Name	Short Description
			reactions, chemical kinetics, equilibrium principles, complex formation, precipitation and dissolution reactions, and oxidation-reduction reactions. These fundamental chemical principles are applied to the natural and polluted water, water, and wastewater treatment processes.
2	CE 508	Physicochemical Treatment Processes	Fundamentals of process kinetics and reactor engineering. Aeration and gas transfer, coagulation and flocculation, sedimentation, filtration, and disinfection. Adsorption, ion exchange and membrane processes. Chemical sludge treatment and handling.
3	CE 509	Biological Treatment Processes	Kinetics of biological growth. Modeling of suspended and attached growths. Aerobic treatment processes: Trickling filters, rotating biological contactors, activated sludge, Aerated lagoons and stabilization ponds. Sludge treatment.
4	CE 543	Planning and Design of Water and Wastewater Networks	Development of design skills in water distribution and wastewater collection networks: Estimation of flows; systems layout and planning; selection and setting of design criteria; computer network analysis and design. Preparation of design reports for selected local projects.
5	CE 544	Environmental Air Pollution	Air pollutants causes, sources, and effect; air emission standards; design of equipment and system for removal of particulate and gaseous pollutants emitted from stationary source; air pollution and meteorology, emission dispersion equations and modeling.
6	CE 546	Solid Waste Management	Study of the engineering and management principles, practices, and techniques for the management and disposal of solid wastes. Topics include characteristics, generation, transport, processing, resource recovery, disposal, landfill design and operation, leachate management, and contaminant transport.
7	CE 547	Industrial and Hazardous Waste Management	Definition and characteristics of industrial and hazardous wastes. Industrial and hazardous waste generation rates and prevention. Introduction to Industrial and hazardous waste collection, transportation, treatment, monitoring, and disposal. Applicable international, federal, and provincial regulations and initiatives. Municipal services and planning associated with industrial and hazardous waste management. Physical, chemical and biochemical treatment technologies, and disposal methods, including landfilling and incineration. Environmental impact of industrial and hazardous waste management.
8	CE 549	Special Topics in Environmental Engineering	Study of special topics in environmental engineering with emphasis on current problems. Participants are expected to write a report and give an oral presentation on an environmental topic of their choice and of local concern. The work may include literature search, laboratory work and field investigation.
9	CE 507	Environmental Microbiology	This course will introduce students to the field of environmental microbiology, which is the study of microbes in natural environments such as soil, water, and air. Investigation will focus on microbial distribution, diversity, physiology, biochemistry, function, and ecology along with commonly employed microbiology methods. Typical issues

SN	Course Code	Course Name	Short Description
			in environmental microbiology will also be discussed, including biotechnology and bioremediation.
10	CE 542	Planning & Design of Treatment Plants	This course contains the selection of water-treatment process unit; determination of installation capacity; determination of dimension, layout and hydraulic analysis of each process unit; determination of layout, dimension, and hydraulic analysis of installation piping/pump, installation mechanical system, installation hydraulic profile, creation of installation system design. Survey and data preparation of the existing water system condition; data preparation of technical aspect of design area condition (ease of operation, human resources, sludge quantity, effluent quality, river water quality/outfall, energy requirement, housing condition, general urban planning, map, and road length, clean water supply facility, etc.), non-technical aspects (construction and operation cost, land availability); calculation of wastewater quantity and quality prediction; selection of treatment technology and flowsheet creation; calculation of operation & process unit dimension and piping length also building utilities.

7. Courses in Transportation Engineering

SN	Course Code	Course Name	Short Description
1	CE 531	Traffic Flow Characteristics	An overview of microscopic and macroscopic traffic flow characteristics (flow, speed & density), and their associated techniques such as traffic Stream modeling, capacity and level of service analysis, shock wave analysis, supply-demand analysis, queuing analysis, and simulation modeling.
2	CE 532	Advanced Transportation Planning	This course offers detailed treatment of the long-term strategic planning aspects of transport systems. The course provides a broad overview of the concepts, issues, techniques, and possible solutions involved in transport planning and evaluation, including environmental and economic considerations. The course focuses on the issues of assessing sustainable development and its relevance in transport, and the problems it poses to transport planning in developing a sustainable transport system.
3	CE 533	Advanced Railway Engineering	Advanced Railway Engineering explores cutting-edge concepts in railway design, construction, maintenance, and operation. The course covers track systems, high-speed rail, signaling, geotechnics, and sustainability. Emphasis is placed on innovative technologies, safety, and project management, preparing students to address modern challenges in railway infrastructure and transportation systems.
4	CE 534	Traffic Flow Operation and Control	The course will give master students an overview of concepts in traffic operations and control. Primarily this course will focus on the application of traffic control methods and devices to improve capacity and safety of urban street systems. Emphasis will also be put on the computer aids and the new technology of signal systems, and highway operations.
5	CE 536	Advanced Geometric Design of Highways	Design designations and criteria. Integration between horizontal and vertical alignments. At-grade intersections; types and design elements. Interchanges: types and design elements. Design of parking facilities and appurtenances. Surface Drainage. Safety considerations.
6	CE 537	Advanced Pavement Design	The course provides master students advanced topics in pavement analysis and design. The course also includes topics related to pavement rehabilitation. The course covers distresses in flexible and rigid pavements (types, causes, and suggested repair), analysis of pavement performance, evaluation of the structural condition of a pavement, analysis of elastic and viscoelastic layer system, mechanistic-empirical pavement design (AASHTOWare Pavement ME Design), sustainable pavement practices and perpetual pavement, and overlay design for both flexible and rigid pavements. The course may include a brief review on advanced pavement materials testing if the student does not have a previous knowledge. Beside these topics, the course attempts to address recent topics related to pavement design through reviewing recently published research. The course also includes report/research assignments on the topics covered.
7	CE 538	Pavement Evaluation	Development of skills in pavement evaluation and maintenance: pavement performance; distresses identification; visual inspection; roughness measurements; skid resistance; structural

SN	Course Code	Course Name	Short Description
		and Maintenance	evaluation; levels and methods of maintenance; and economic analysis of pavement maintenance strategies. Students are expected to carry out pavement evaluations and set maintenance measures for certain pavement sections to practice on real-life situation. Besides these topics, the course attempts to address recent topics related to pavement maintenance through reviewing recently published research. The course includes report/research assignments on the topics covered.
8	CE 539	Traffic Safety Analysis	This course presents topics related to transportation safety analysis. That is to master the road crash research concepts, and identification of the contributing factors to the crash occurrence.
9	CE 540	Intelligent Transportation systems	This course aims to introduce students to the fundamentals of intelligent transportation systems (ITS), focusing on technologies and systems. Topics include: advanced traveler information systems, transportation network operations, public transportation applications, ITS and safety, cooperative ITS, and ITS and mobility. The mobility of the people has become the prevalent element of everyday life, as the roads and parking become more crowded, the investment in the infrastructure focuses more on the use of intelligence rather than on the basic infrastructure, as the basic infrastructure built for the maximum capacity becomes unused for the most of the time, and achieve its full return on investment only in the peak hours, while outside of the peak hours its capacity is heavily underutilized. Intelligent Transport Systems (ITS) use electronics, information and communications technologies to deliver transport improvements instead of extending physical infrastructure, thereby saving money, reducing costs, increasing return on investment while at the same time reducing environmental impact.
10	CE 541	Mass Transportation Systems	This course explores the planning, design, operation, and management of mass transportation systems. Topics include transit modes, system integration, capacity analysis, sustainability, and emerging technologies. Students will develop skills to evaluate and optimize public transport networks, addressing urban mobility challenges and promoting efficient, sustainable transportation solutions.
11	CE 547	Transportation Logistics Planning	This master's course explores advanced concepts in transportation logistics, focusing on the planning, design, and optimization of multimodal transport systems. Students will analyze freight and passenger movement, network modeling, and sustainable logistics strategies. Emphasis is placed on integrating technology and data analytics to solve real-world transportation challenges, preparing graduates for leadership roles in modern civil engineering and logistics sectors.
12	CE 548	Machine Learning and Artificial Intelligent Application in Transportation Systems	This course aims to introduce the students to the fundamentals of machine learning (ML) and artificial intelligence (AI) and their applications in the transportation sector. Students will get exposed to a wide range of AI applications related to road safety, micro mobility and sustainability. Topics include: exploratory data analysis, regression analysis, classification and clustering algorithms. Moreover, students taking this course will gain hands-on experience of design, and implementation of a technical project using real-world transportation datasets.

SN	Course Code	Course Name	Short Description
13	CE 550	Geographic Information Systems Application in Transportation Systems	This course aims to provide a comprehensive understanding of the fundamentals of the Geographic Information Systems (GIS) and introduce transportation infrastructure and road safety related data collection, and analytical methodologies and techniques using GIS. Topics include: basics of GIS, geospatial data and geo-referencing techniques, visualization and GIS data query, spatial analysis and modeling, multilayer mapping and overlay analysis, micro and macro simulation models, and heat maps and hotspot analysis.
14	CE 551	Statistical Modeling in Transportation	This course aims to provide a good understanding of statistical methods to analyze transportation data. Topics include: Poisson model, negative binomial models, models with random effects, univariate and multivariate models, and discrete choice modeling. This course is an advanced subject in econometrics with a focus on transportation demand modelling. This course covers a broad range of econometric modelling techniques and their applications in transport systems. Specific emphasis will be placed on estimation process of the models and their reliability in prediction. The topics of the course includes transport data analysis and modelling, linear regression models for continuous and discrete outcomes, interpretation of model estimation results, time series analysis, and survival analysis in transport systems.
15	CE 552	Highway Infrastructure Management	Processes and techniques of managing rehabilitation and maintenance of highway infrastructure facilities including roads. Evaluation of pavement, and roadway maintenance, the primary emphasis on data collection, life cycle cost analysis, priority setting and optimization, and program development strategies.
16	CE 553	Design and Performance of airport Pavement	Pavement types and materials, aircraft traffic consideration and loading analysis, design procedure for flexible and rigid airport pavement. methods of classifying load ratings of aircraft and bearing strengths of airfield pavements, pavement thickness requirements, overlay design, evaluation, and performance of airport pavements.
17	CE 554	Sustainable Transportation Assets Management	Overview of the multimodal transportation system, data collection processing, and management, transportation performance modeling, transportation needs assessment economic analysis of investment strategies for highway pavement and traffic control and safety, transportation environmental impact analysis, project selection, programming, and trade-off analysis methods.
18	CE 555	Pavement materials and design of Asphalt Mixes	This course explores advanced concepts in pavement materials, focusing on the characterization, selection, and performance of asphalt materials. Students will learn state-of-the-art methods for designing asphalt mixes, evaluating durability, and optimizing pavement structures for sustainability and longevity in civil infrastructure projects.The topics include the testing methods of asphalt cement, aggregate, and hot mix asphalt; and how these tests can be used to predict Hot Mix Asphalt performance. The course also provides the latest improvement in the method of design of Hot Mix Asphalt to satisfy the requirements of different applications in pavement construction field.

SN	Course Code	Course Name	Short Description
19	CE556	Transportation Economy	Transport system costs and benefits. Engineering economic feasibility and evaluation methods. Evaluation of congestion in transport facilities. Economic regulations in public and private transport sectors. Shadow pricing. Multi-objective evaluation.
20	CE 599	Special Topics in Transportation	This course covers a wide range of topics of current interest in planning, design, construction, operation, maintenance and / or management of transportation systems. The specific subject will be selected based on the need, student interest and faculty expertise.

8. Thesis and Project Courses

SN	Course Code	Course Name	Short Description
1	CE 598	Research Project in Plan B	The Research Project provides students with an opportunity to learn about the research process and participate in it by analyzing, presenting, and writing up their research results. The Research Project course should encompass a replication of the work done in the latest recent journal papers. The research project can take the form of experimental work and/or theoretical analysis related to the research subject. A final course report should be presented, and a final presentation of the work is to be delivered to an examination committee.
2	CE 596	Thesis Research Proposal	This course is intended for preparing the M.Sc. thesis proposal. The M.Sc. thesis proposal should be related to a contemporary civil engineering topic.
3	CE 600	Thesis in Plan A	The master's Thesis course runs throughout a full year to implement all tasks and objectives as given in his research proposal and as was described in CE 596. During this course, the student will implement his research methodology, that may also include design and performing empirical and/or experimental study, in addition to prepare the final version of his M.Sc. thesis and present as well as defend the work in an oral presentation.

APPENDIX B. COURSE TEXTBOOKS

1. Common Courses

SN	Course Code	Course Name	Textbooks
1	STAT 503	Probability and Mathematical Statistics	• Probability and Statistics for Engineers and Scientists. By: R.E.Walpole and R.H.Myers
2	MATH 505	Numerical Linear Algebra	• Applied Linear Algebra using MATLAB, Pages: 518, Heldermann Verlag Press, (2008), by R. Butt.

			• Numerical Linear Algebra and Optimization using MATLAB, Pages: 1160, Mercury Learning and Information, (2011), by R. Butt. • An Introduction to Applied Numerical Linear Algebra Using MATLAB; Pages: 642, Alpha Science International Ltd., Oxford, United Kingdom, (2015), by R. Butt.
3	CE 572	Computer Applications in Civil Engineering	• Dependent on the chosen special topic(s) • Students are encouraged to search the internet for relevant research materials in reputable journals and scientific websites.

2. Courses in Construction Engineering and Management

SN	Course Code	Course Name	Textbooks
1	CE 511	Construction Planning and Control	• Construction Planning and Scheduling (4th Edition) by Jimmie W. Hinze, 2011. • Project Management with CPM, PERT, and Precedence Diagramming,3rd Edition, by Moder J., Phillips, C., and Davis, E. • International Project Management, Academic Press, 2003, Miner Media, Eng Mgt 461, International Case Studies, Bennet Lientz and Kathryn Rea, (ISBN-0-120449985-6). • Eldosouky, A.I., Principles of Construction Project Management, Tanta University, 2001.
2	CE 512	Construction Management	• Harris, F., & McCaffer, R. (2013). Modern construction management. John Wiley & Sons. • Dainty, A., Moore, D., & Murray, M. (2007). Communication in construction: Theory and practice. Routledge
3	CE 513	Construction Engineering	• R. L. Peurifoy, C. J. Schexnayder, A. Shapira, and R Schmitt, Construction • Planning, Equipment, and Methods, McGraw-Hill PublishingCompany • S.W. Nunnally, Construction Methods and Management, Prentice-Hall, Inc., Last edition
4	CE 514	Decision Making and Risk Management in Construction	• Singh, Amarjit, and C. Eng. "Quantitative Risk Management and Decision Making in Construction." American Society of Civil Engineers, 2017.
5	CE 515	Cost Analysis and Control	• Schuette, Stephen D. and Liska Roger W. Building Construction Estimating. McGraw-Hill Higher Education, Inc. USA. • Robert L. Peurifoy and Garold D. Oberlender. Estimating Construction Costs. McGraw-Hill Higher Education, Inc. USA. • James J. Adrian. Construction Estimating: An Accounting and Productivity Approach. Prentice-Hall Inc., Upper Saddle River, NJ, USA. • Steven J. Peterson. Construction Accounting and Financial Management, Pearson Higher Education, Inc. Upper Saddle River, NJ, USA.

SN	Course Code	Course Name	Textbooks
6	CE 516	Construction Engineering Contracts	• Collier, Keith (2011). Construction Contracts. 3rd Edition, Prentice-Hall, Inc., Upper Saddle River, New Jersey
7	CE 517	Computer Applications in Construction	• Schwalbe, K. (2015). Information technology project management. Cengage Learning. • Hegazy, T. (2002). Computer-Based Construction Project Management: Pearson New International Edition. Pearson Higher Ed. • Paulson Jr, B. C. (1994). Computer applications in construction. McGraw-Hill, Inc. • Williams, T. (2006). Information Technologies for Construction Managers, Architects and Engineers. Thomson Delmar Learning. • Hardin, B., & McCool, D. (2015). BIM and construction management: proven tools, methods, and workflows. John Wiley & Sons • International Project Management, Academic Press, 2003, Miner Media, Eng Mgt 461, International Case Studies, Bennet Lientz and Kathryn Rea, (ISBN-0-120449985-6).
8	CE 578	Value Engineering	• Value Engineering: Practical Applications for Design, Construction, Maintenance & Operations, Alphonse Dell'Isola, R S Means Co., 1997. • Ingredients for Accurate Construction Cost Estimating, G.M. Hollander, Actual Specifying Engineer, June 26, 1974 • Techniques of Value Analysis and Engineaing, D. Miles, Second Edition, McGraw-Hill, 1972. • Life Cyck Costing for Design Professionals, A.J. Dell'Isola and S.J. Kirk Second Edition, (New York: McGnw Hill, Inc., 1995).
9	CE 510	Construction Management Research	• Research Methods for Construction, 5th Edition. Authors: Richard F. Fellows, Anita M. M. Liu. ISBN: ISBN: 978-1-119-81473-3 Publication Date & Copyright: 2021 Wiley-Blackwell.

3. Courses in Structural Engineering

SN	Course Code	Course Name	Textbooks
1	CE 563	Advanced Structural Analysis	• Igor A. Karnovsky and Olga Lebed (2010). Advanced Methods of Structural Analysis. Springer. • William McGuire, Richard Gallagher, and Ronald Ziemian. Matrix Structural Analysis. 2nd Edition, John Wiley & Sons, Inc.
2	CE 564	Advanced Solid Mechanics	• A.P. Boresi, R.J. Schmidt, Advanced Mechanics of Materials, John Wiley & Sons, Inc., 6th Edition., 2003. • Ferdinand Beer .. et al., Mechanics of Materials, McGraw-Hill, latest edition.

SN	Course Code	Course Name	Textbooks
3	CE 565	Theory of Plates and Shells	• Eduard Ventsel and Theodor Krauthammer, "Thin Plates and Shells - Theory, Analysis, and Applications", Marcel Dekker, Inc. 2001 • Timoshenko, S.P. Winowsky. S., and Kreger, "Theory of Plates and Shells", McGraw-Hill Book Co. 1990. • Ugural, A. C. Stresses in Plates and Shells. 2nd ed. New York, NY: McGraw-Hill, 1998
4	CE 566	Plasticity in Structural Engineering	• Neal, B.G., 1985. The plastic methods of structural analysis. 3rd Ed. John Wiley & Sons. • Wight, J. K. Reinforced Concrete: Mechanics and Design. Global Edition." (2016)-Chapter 14 • Chakrabarty, J., 2016. Theory of plasticity. 3rd Ed. Elsevier. • Chen, W.F. and Han, D.J., 2007. Plasticity for structural engineers. J. Ross Publishing.
5	CE 567	Stability of Structures	• Bažant ZP, Cedolin L. Stability of structures: elastic, inelastic, fracture, and damage theories. Courier Corporation; 2003.
6	CE 568	Structural Dynamics	• Dynamics of Structures: Theory and Applications to Earthquake Engineering by Anil K. Chopra, 4th SI Edition, Pearson-Prentice Hall, 2014
7	CE 569	Finite Element Method in Structural Analysis	• Y. M. Desai, T. L. Eldho, A. H. Shah, Finite Element Method with Applications in Engineering, Pearson India., 2011. • J. N. Reddy, Introduction to the Finite Element Method, 3rd edition, McGraw-Hill Education, 2006
8	CE 573	Behavior of Metallic Structures	• Structural Steel Design", Jack C. Mc Cormac,& Stephen Csernak, Latest Edition, Pearson Education Limited. • Steel Structures: Controlling Behavior Through Design", Robert E. Englekirk, 1st Edition, John Wiley and Sons Ltd, 1994
9	CE 574	Behavior of Reinforced Concrete Members	• Reinforced Concrete: Mechanics and Design, (7th) Edition, James K.Wight. (2015)
10	CE 575	Prestressed Concrete Structures	• Prestressed Concrete Analysis and Design: Fundamentals by Antoine E. Naaman. Techno Press; 3rd edition, 2012.
11	CE 576	Structural Reliability	• Reliability of Structures by A. S. Nowak and K. R. Collins, McGraw-Hill, International Edition 2000.
12	CE 577	Advanced Concrete Technology	• Mindess, S., and Young, F.J., Concrete, 2nd Edition, 2002.

4. Courses in Water Resources Engineering

SN	Course Code	Course Name	Textbooks
1	CE 501	Design of Hydraulic Structures	• Hydraulic structures, 4th Edition: P. Novak, A.I.B. Moffat, C. Nalluri and R. Narayanan,Taylor and Francis Group, ISBN:9780415386265 • Theory and Design of Irrigation Structures Vol. II , Latest Ed, R. S. Varshney et al

SN	Course Code	Course Name	Textbooks
			• Mays, L. W.. Water Resources Engineering (2nd ed.). Wiley.Todd D.K., Ground Water Hydrology, John Wiley and Sons, 2000. • Haestad Methods, Donald V. Chase, Dragan A. Savic, Thomas M. Walski., Water Distribution Modeling, Haestad; 1st edition (April 1, 2001). • Nazih K. Shammas, Water Supply and Wastewater Removal, Wiley., Third edition, 2011. • Mays, L. W.. Water Resources Engineering (2nd ed.). Wiley.Todd D.K., Ground Water Hydrology, John Wiley and Sons, 2000.
2	CE 520	Advanced Hydraulics	• Bear J., Hydraulics of Groundwater, McGrow-HillInternational, 1979. • Haestad Methods, Donald V. Chase, Dragan A. Savic, Thomas M. Walski., Water Distribution Modeling, Haestad; 1st edition (April 1, 2001). • Nazih K. Shammas, Water Supply and Wastewater Removal, Wiley., Third edition, 2011. • Mays, L. W.. Water Resources Engineering (2nd ed.). Wiley.Todd D.K., Ground Water Hydrology, John Wiley and Sons, 2000.
3	CE 522	Groundwater Hydrology	• Todd D.K., Ground Water Hydrology, John Wiley and Sons, 2000. • Driscoll,F.,Ground water and Wells,St.Paul,Minnesota,IIEd.,1986. • Raghunath H.M.,Ground Water Hydrology, Wiley Eastern Ltd., Second reprint, 2000. • Willis,R.andW.W.G.Yeh, Groundwater Systems Planning and Management, Prentice-Hall, 1987. • C.Walton, Groundwate rResources Evaluation, McGrawHill, 1970. • O.D.L. Strack, Groundwater Mechanics, PrenticeHall,1989. • S.P. Garg, Groundwater and Tube Wells, Oxford & IBH Publishing Co., 1993
4	CE 525	Surface Water Hydrology	• Dingman, S. L., 1994. Physical Hydrology. Prentice Hall, GB 661.2 D56 • Chow, V. T., Maidment, D. R., and Mays, L. W., 1988, Applied Hydrology, McGraw- Hill, GB 661.2 C43 • Brutsaert, W., Hydrology an Introduction, Cambridge University Press, 2005 • Introduction to Surface Water Hydrology Modelling, J. Nossent and A. van Griensven
5	CE 527	Water Resources Planning	• Grigg, N. S. (1985). Water resources planning. Millenium Development Goals Report 2014 (available online at www.un.org) • Mays L.W. and Y.K. Tung, Hydrosystems Engineering and Management, McGraw-Hill, 1992. • Dzurik, A. A., & Theriaque, D. A. (2003). Water resources planning. Rowman & Littlefield.
6	CE 528	Water Resource Systems Analysis	• Mays L.W. and Y.K. Tung, Hydrosystems Engineering and Management, McGraw-Hill, 1992.
8	CE 521	Irrigation Engineering	•

SN	Course Code	Course Name	Textbooks
9	CE 502	Hydrometry	• Hydrometry: Principles and Practice, 2nd Edition , Reginald W. Herschy (Editor) • Hydrometry, A comprehensive introduction to the measurement of flow in open channels ByW. Boiten , 3rd Edition, eBook ISBN9781003059288. • Hydrometry IHE Delft Lecture Note Series By: W. Boiten
10	CE 503	Drainage Engineering	• Bhattacharya AK and Michael AM. 2013. Land Drainage, Principles, Methods and Applications. Vikas Publication House, Noida (UP) • Ritzema H.P.1994 Drainage Principles and Applications, ILRI Publication
11	CE 524	Sediment Transport	• Egashira, S. (2009): Mechanics of Sediment Transportation and River Changes. • Garcia, M., 2008, Sedimentation Engineering, ASCE manual No. 110.
12	CE 504	Numerical Methods in Water Resources	• Bear J., Hydraulics of Groundwater, McGrow-Hill International, 1979. • Haestad Methods, Donald V. Chase, Dragan A. Savic, Thomas M. Walski., Water Distribution Modeling, Haestad; 1st edition (April 1, 2001). • Students are encouraged to read different journal papers concerning planning and design of irrigation systems.
13	CE 526	Probability & Statistics in Hydrology	• Probability and Statistics in Hydrology, V. Yevjevich, Water Resources Publications, 1972. • Stochastic Processes in Hydrology, V. Yevjevich, Water Resources Publications, 1972. • Stochastic Approaches to Water Resources, Vol. 1, H.W. Shen, 1976. • Statistical methods in Hydrology, C.T. Haan, Iowa State Press, 2002.

5. Courses in Geotechnical Engineering

SN	Course Code	Course Name	Textbooks
1	CE 581	Advanced Soil Mechanics	• An Introduction to Geotechnical Engineering by Robert D. Holtz, William D. Kovacs, Thomas C. Sheahan, 2nd Edition.
2	CE 582	Advanced Shallow Foundation Engineering	• INTRODUCTION TO ROCK MECHANICS. Second Edition, Goodman, Richard E., Published by John Wiley & Sons, 1989, ISBN 10: 0471617180 / ISBN 13: 9780471617181
3	CE 583	Retaining Structures and Slopes	• Clayton, C. R. I., Woods, R. I., Bond, A. J., & Milititsky, J. (2014). Earth pressure and earth-retaining structures. Boca Raton: CRC Press. • Duncan, J. M., Wright, S. G., & Brandon, T. L. (2014). Soil Strength and Slope Stability, 2nd Edition. John Wiley & Sons.
4	CE 584	Geotechnical Measurements and Exploration	• Hand Book of Geotechnical Investigation and Design Tables 2007, Burt G. Look

5	CE 585	Applied Rock Mechanics	• ROCK MECHANICS: theory and applications with case histories Wittke, W. 1990 SpringerBerlin Heidelberg New York Tokyo. • EXPERIMENTAL ROCK MECHANICS, 1st Edition - Kiyoo Mogi, Reference - 361 Pages
6	CE 588	Numerical Methods in Geotechnical Engineering	• Chapra, S. C. and Canale, R.P. (2010).“Numerical Methods for Engineers” McGraw-Hill, New York, 6th Edition. • David M Potts and Lidija Zdravkovic. (1999). “Finite Element Analysis in Geotechnical Engineering – Theory”, Thomas Telford Publishing Ltd., U.K.
7	CE 589	Special Topics in Geotechnical Engineering	• Some books are recommended for certain topics • Notes are distributed for some of the topics. • Students are supplied with and encouraged to read excerpts from different books and technical papers relevant to some of the covered topics
8	CE 586	Offshore Engineering	• Offshore engineering books and related research papers • Students are encouraged to read different journal papers concerning offshore geotechnical engineering

6. Courses in Environmental Engineering

SN	Course Code	Course Name	Textbooks
1	CE 506	Environmental Chemistry	• Vernon L. Snoeyink (1980) Water chemistry, New York: Wiley.
2	CE 508	Physicochemical Treatment Processes	• Water Treatment: Principles and Design, 3rd ed., John Wiley & Sons.
3	CE 509	Biological Treatment Processes	• Metcalf/Eddy: Wastewater Engineering: Treatment and Reuse, 4th edition, McGraw Hill, Boston, MA.
4	CE 543	Planning and Design of Water and Wastewater Networks	• Water and Wastewater Systems Analysis, Volume 34, 1st Edition
5	CE 544	Environmental Air Pollution	• C. David Cooper and F. C. Alley (2011) Air Pollution Control: A Design Approach, 4th edition: Waveland Press. • Daniel A. Vallero (2014) Fundamentals of Air Pollution, 5th edtion: Elsevier. • Noel De Nevers (2017) Air Pollution Control Engineering, 3rd edition: Waveland Press.
6	CE 546	Solid Waste Management	• Tchobanoglous G., Theisen H., Vigil S. A. " Integrated Solid Waste Management: Engineering Principles and Management Issues, McGraw-Hill (1993). • Vesilind P. A. and Worrell W. A. “Solid Waste Engineering” (2015)
7	CE 547	Industrial and Hazardous Waste Management	• Industrial Wastewater Management, Treatment and Disposal, WEF Manual of Practice No. FD-3, 3rd Edition, WEF Press and McGraw Hill, 2008. • Geoenvironmental Engineering: Site Remediation, Waste Containment and Emerging Waste Management Technologies, Hari D. Sharma and Krishna R. Reddy, John Wiley and Sons, Inc., 2004.

			• Bahadori, A. (2014). Waste management in the chemical and petroleum industries. West Sussex, United Kingdom: Wiley.
9	CE 507	Environmental Microbiology	• Environmental Engineering textbook related to the contemplating issue and treatment strategies. (e.g. Microbial World, Env. Microbiology)
10	CE 542	Planning & Design of Treatment Plants	• Metcalf/Eddy: Wastewater Engineering: Treatment and Reuse, 4th edition, McGraw Hill, Boston, MA

7. Courses in Transportation Engineering

SN	Course Code	Course Name	Textbooks
1	CE 531	Traffic Flow Characteristics	• Traffic Flow Fundamentals: By A. D. May; Prentice Hall, 1990 (ISBN: 0139260722)
2	CE 532	Advanced Transportation Planning	• Modelling Transport, 4th Edition, Juan de Dios Ortuzar, Luis G. Willumsen, ISBN: 978-0-470-76039-0 • Black, J. (1981) Urban Transport Planning: Theory and Practice, (London: Croom Helm). • Hensher, D.A. and Button, K.J. (2000) Handbook of Transport Modelling, Pergamon. • Taylor, MAP, Young, W and Bonsall, P (1996) Understanding Traffic Systems - Data, analysis and presentation, Avebury Technical, Ashgate, England. • Thomas, R. (1991) Traffic Assignment Techniques, Avebury Technical. • Transportation Research Board (1994) Highway Capacity Manual: Special Report 209. Third Edition (Washington, D.C.: Transportation Research Board, National Research Council).
3	CE 533	Advanced Railway Engineering	• Railway Management and Engineering by V Profillidis (4th Edition) • Fundamentals Of Railway Track Engineering by Arnold D. Kerr
4	CE 534	Traffic Flow Operation and Control	• Introduction to Traffic Flow Theory: An introduction with exercises, 1st Edition, by V.L. Knoop (2017) • Global Practices on Road Traffic Signal Control: Fixed-Time Control at Isolated Intersections, 1st Edition, by Keshuang Tang, Manfred Boltze, Hideki Nakamura, Zong Tian (2019) • Overseas Management of Traffic Congestion and Travel Demand (Traffic Infrastructure- Roads, Highways, Bridges, Airports and Mass Transit), by Jordana R. Salamone (2011)
5	CE 536	Advanced Geometric Design of Highways	• A Policy on Geometric Design of Highways and Streets, AASHTO, 6th Edition (2011) or later. • Roadside Design Guide, AASHTO, 4th Edition (2011) or later.
6	CE 537	Advanced Pavement Design	• A Policy on Geometric Design of Highways and Streets, AASHTO, 6th Edition (2011) or later. • Huang, Yang H., "Pavement Analysis and Design", Prentice-Hall, Inc. Englewood Cliffs, NJ, 2nd ed., 2010 • Rajib Mallik, Tahar ElKorchi, Pavement Engineering: Principles and Practice, 3rd Edition,2017

SN	Course Code	Course Name	Textbooks
7	CE 538	Pavement Evaluation and Maintenance	• "Modern Pavement Management", Haas, Hudson and Zaniewski.
8	CE 539	Traffic Safety Analysis	• Highway Safety Analytics and Modeling by Dominique Lord, Xiad Qin, and Srinivas R. Geedipally • Highway Safety Manual by AASHTO • Road Safety Fundamentals by FHWA
9	CE 540	Intelligent Transportation systems	• Intelligent Transportation Systems: Functional Design for Effective Traffic Management by Robert Gordon
10	CE 541	Mass Transportation Systems	• Urban Transit Systems And Technology By Vukan R. Vuchic
11	CE 547	Transportation Logistics Planning	• Logistics Transportation Systems by Md Sarder
12	CE 548	Machine Learning and Artificial Intelligent Application in Transportation Systems	• Introduction to Statistical Learning by Gareth James • Introduction to Machine Learning with Python, Andreas C. Müller & Sarah Guido • Practical Statistics for Data Scientists: 50+ Essential Concepts Using R and Python 2nd Edition
13	CE 550	Geographic Information Systems Application in Transportation Systems	• Geographic Information Systems for Transportation (GIS-T) by Shih-Lung Shaw and Dr. Jean-Paul Rodrigue • Geographic Information Systems for Transportation: Principles and Applications by Harvey J. Miller, Shih-Lung Shaw, Shih-Lung Shaw
14	CE 551	Statistical Modeling in Transportation	• Statistical and Econometric Methods for Transportation Data Analysis by Simon Washington, Matthew G. Karlaftis, Fred Mannering, and Panagiotis Anastasopoulos
15	CE 552	Highway Infrastructure Management	• k. Sinha, and S. Labi, Principles of Highway Infrastructure Asset Management, Taylor and Francis Group, 2019.
16	CE 553	Design and Performance of airport Pavement	• N. Ashford and P. Wright, Airport Engineering, John Wiley and Sons. 1984
17	CE 554	Sustainable Transportation Assets Management	• Autoroads Guide to asset management, Sydney NSW , 2018 • Asset management for the roads sector, OECD, 2001 • Transportation Asset Management Methodology and Applications By Zongzhi Li • AASHTO Transportation Asset Management Guide: A Focus on Implementation,
18	CE 555	Pavement materials and design of Asphalt Mixes	• Hot Mix Asphalt Material Mixture Design and Construction'" by F. Roberts, P. Kandhal, and T. W. Kennedy • Pavement Analysis and Design, Huang, second edition • AASHTO Transportation Asset Management Guide: A Focus on Implementation,
19	CE556	Transportation Economy	• K. Button, Transport Economics, 3rd edition, 2010
20	CE599	Special Topical in Transportation	• NA

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