NAZARBAYEV UNIVERSITY
SCHOOL OF ENGINEERING

Department of Civil and Environmental Engineering

Program Handbook

BEng (Hons) Degree Program in Civil and Environmental Engineering

Academic year 2018-19

BEng (Hons) Degree Program
Civil and Environmental Engineering

Full-time, Credit-based

Program Handbook

(2018/19)

Department of Civil and Environmental Engineering

Bachelor of Engineering (Honours) Degree Program

in

Civil and Environmental Engineering

Full-time Credit-based

Program Booklet

2018/2019

BEng(Hons) in Civil and Environmental Engineering Program (Full-Time)

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28 Course Specifications

This Program Booklet is subject to review and changes which the Department can decide to make from time to time. Students will be informed

1. GENERAL INFORMATION

1.1 Cohort of Intakes and readership

This program handbook is the definitive program document for the 2018/19 cohort. Just in case any updated information is necessary after the publication of this handbook, students are requested to refer to the **https://seng.nu.edu.kz/home/programs/undergraduate-programs** for the most updated information. Should there be any discrepancy between the contents of this handbook and Nazarbayev University (NU) regulations, University regulations always prevail.

1.2 Program Information

Title of Program	**Bachelor of Engineering (Honors) in Civil and Environmental Engineering**
Host Department	Department of Civil and Environmental Engineering
Program Structure	Credit-based
Final Award	Bachelor of Engineering (Honors) in Civil and Environmental Engineering
Mode of Attendance	Full-time
Professional Recognition	The program has been designed based on the ABET accreditation requirements.

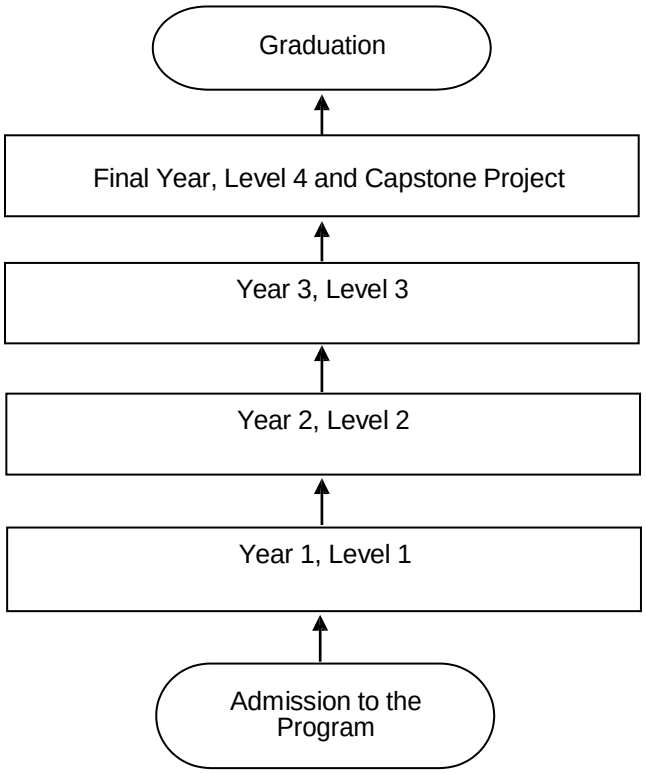
Duration	Normal Year 1 Intake Full-time Mode: 4 years nominal, 5 years maximum
Total Credits for Graduation	**248** ECTS credits

1.3 Modes of Study

A mode of study is characterized by the credits, courses required and the progression pattern in Year 1 to Year 4. Currently the program can only be pursued in the "Normal full-time" study mode.

Normal Full-time Mode

The students will normally pursue their study by going through Year 1, Year 2, Year 3 and Year 4 in full time and then graduate at the end of Year 4 after having satisfied all program requirements. Each year of study is split into discrete interlinked courses. The courses of earlier years can be pre-requisites to subsequent courses in later years. Some courses are common between programs.



2. RATIONALE, AIMS AND LEARNING OUTCOMES OF THE PROGRAM

2.1 Background and Rationale

Kazakhstan is now knocking on the door of being a developed country and has the potential to be so soon, based on the estimation of reserves in oil, gas, and minerals. Now civil engineers and chemical, electrical, and mechanical engineers are setting the ground and developing engineering to enhance the country. The development of the natural resources has been the basis for the economic growth of Kazakhstan, however the other side of this development, the environmental issues have been always segregated and forgotten for a long time. Now it is time for civil and environmental engineers to do their pivotal roles, i.e. the natural resources should be wisely and properly developed by the engineers to prevent their extinctions under a fair environmental protection regime.

We believe that the Civil and Environmental Engineering Department and its relevant disciplines are required to produce the essential engineering education for students and training programs for site professionals and to harbor and carry out significant research projects to solve serious impending environmental disasters such as climate change and global contaminant transport, threatening the longevity of the earth and human well-being.

Consequently, we believe that the Civil and Environmental Engineering Department plays critical and proper roles for the society of Kazakhstan by focusing on the expertise of the faculty members, developed ABET-based core courses, and relevant research projects.

2.2 Aims

The aims of the Program are:

1. Acquire a strong fundamental scientific and technological knowledge base with critical thinking skills necessary for life-long learning and to pursue a variety of civil and environmental engineering careers in industry, academic, and government within Kazakhstan or abroad;
2. Apply engineering skills incorporating the use of standards, computers, experiments, and realistic constraints to analyze, design, and solve problems associated with the civil and environmental engineering profession;
3. Understand the role as civil engineers, the moral obligations, ethical standards, and professional integrity of civil and environmental engineering practice and have an awareness of safety, legal, environmental, and social impact on the role of the engineering professional in a multicultural, global economy
4. Develop the foundation for leadership through the abilities to communicate technical and professional information effectively, as well as to work independently or as a member in a team.

2.3 Relationship of Program Aims to University Mission

The mission of the University is: “To be a model for higher education reform and modern research in Kazakhstan and to contribute to the establishment of Astana as an international innovation and knowledge hub”.

The Program Aims are aligned to the University Mission.

2.4 University Graduate Attributes

It is NU’s educational mission to nurture competent professionals who are also critical thinkers, effective communicators, innovative problem solvers, lifelong learners, and ethical leaders. The university graduate attributes are as follows:

1) Possess an in-depth and sophisticated understanding of their domain of study;
2) Intellectually agile, curious, creative, and open-minded;
3) Thoughtful decision-makers who know to involve others;
4) Entrepreneurial, self-propelling and able to create new opportunities;
5) Fluent and nuanced communicators across languages and cultures;
6) Cultured and tolerant citizens of the world while being good citizens of their respective countries;
7) Possess high personal integrity; and
8) Prepared to take a leading role in the development of their country.

2.5 Learning Outcomes of the Program

On successful completion of the BEng (Hons) in Department of Civil and Environmental Engineering students will be able to:

1. An ability to identify, formulate, and solve complex engineering problems by applying principles of engineering, science, and mathematics;
2. An ability to apply the engineering design process to produce solutions that meet specified needs with consideration for public health and safety, as well as global, cultural, social, environmental, economic, and other factors, as appropriate to the discipline;
3. An ability to develop and conduct appropriate experimentation, analyze and interpret data, and use engineering judgment to draw conclusions;
4. An ability to communicate effectively with a range of audiences;
5. An ability to recognize ethical and professional responsibilities in engineering situations and make informed judgments, which must consider the impact of engineering solutions in global, economic, environmental, and societal contexts;
6. An ability to recognize the ongoing need to acquire new knowledge, to choose appropriate learning strategies, and to apply this knowledge;
7. An ability to function effectively as a member or leader of a team that establishes goals, plans tasks, meets deadlines, and creates a collaborative and inclusive environment.

2.6 Relationship of Program Learning Outcomes to Program Aims

Program Learning Outcomes	Program Aims			
	1	2	3	4
1	X	X		
2		X	X	
3	X	X		
4			X	X
5	X		X	X
6	X	X		
7			X	X

2.7 Relationship of Program Learning Outcomes to University Graduate Attributes

NU graduate attributes	**Program Learning Outcomes**						
	1	**2**	**3**	**4**	**5**	**6**	**7**
1. Possess an in-depth and sophisticated understanding of their domain of study	X	X	X				
2. Be intellectually agile, curious, creative and open-minded						X	
3. Be thoughtful decision makers who know how to involve others		X					
4. Be entrepreneurial. Self-propelling and able to create new opportunities		X				X	
5. Be fluent and nuanced communicator across languages and cultures				X			X
6. Be cultured and tolerant citizen of the world				X			X
7. Demonstrate personal integrity			X		X		
8. Be prepared to take a leading role in the development of their country					X		X

3. ADMISSION REQUIREMENTS

3.1 Progression from the NU Foundation Year Program (NUFYP)

Upon completion of the NUFYP, students may be eligible to continue their studies in one of the undergraduate programs at the School of Engineering. Any student who is progressed and then decides not to attend NU Undergraduate (UG) program must notify the university as quickly as possible by submitting a completed withdrawal form. NUFYP student who do not submit the withdrawal form will be automatically dismissed after a certain period.

Unconditional progression: Those students who satisfy the requirements for unconditional progression as described in the Criteria below are automatically eligible for progression subject to the availability of space in the program. Progression decisions are recommended by the School's Progression Committee.

UNCONDITIONAL PROGRESSION REQUIREMENTS

	Abbreviations	**Course Title**	**Score**
	FMAT 020	Foundation Statistics	70
	FMAT 030	Foundation Mathematics for Life Science (Biology & Chemistry)	
	FMAT 040	Foundation Mathematics for Physical Science	
AND	FEAP 020	Foundation English for Academic Purposes 2	65
OR	FHUM 030	Foundation of Humanities & Social Sciences 2	65
	FSCI 030	Essential Biology & Chemistry 2	
	FPHY 030	Foundation 'Physics'	

GPA conditional progression: Students who do not meet the requirements for unconditional progression may be progressed on a GPA conditional basis as explained below:

1) A student, whose NUFYP subject scores do not meet the minimum unconditional progression criteria but meet the criteria for conditional progression (see table on Conditional Progression GPA), may be recommended to progress on a GPA conditional basis at the discretion of the School Progression Committee;
2) Student progressed as a GPA Conditional basis must achieve a minimum GPA of 2.00 at the end of his or her first semester of undergraduate study or the student is subject to dismissal;

CONDITIONAL PROGRESSION (GPA)

	Abbreviations	**Course Title**	**Score**
	FMAT 020	Foundation Statistics	60
	FMAT 030	Foundation Mathematics for Life Science (Biology & Chemistry)	
	FMAT 040	Foundation Mathematics for Physical Science	
AND	FEAP 020	Foundation English for Academic Purposes 2	65
OR	FHUM 030	Foundation of Humanities & Social Sciences 2	60
	FSCI 030	Essential Biology & Chemistry 2	
	FPHY 030	Foundation 'Physics'	

As some majors are in more demand than others, the Schools have the right to limit their progression decisions based on the capacity of any individual program. Non-progressed students will be processed in accordance with University internal regulations on dismissal and withdrawal.

3.2 Direct Entry Admission Requirements

3.2.1 Admission to the undergraduate program is based on selection process

3.2.2 One of the following categories of applicants may participate in the selection process:

a) Secondary school graduates with certificate or its foreign equivalent or certificates/diploma on completion of a college or IB Diploma Program, A-level, UK Foundation Program or NIS Grade 12 Certificate;

b) Students of the final year of secondary school or its foreign equivalent, or final year college or IB Diploma Program or UK Foundation Program or NIS Grade 12 Certificate students;

c) Applicants who completed at least one academic year of an undergraduate program at a university with CGPA not less than 3.0 out of 4.0. They shall be considered for admission to the first or second year of the undergraduate program as transfer students. Transfer credits are identified by Admission committee on the basis of detailed course descriptions in accordance with the Academic Policies and Procedures for Undergraduate Schools of NU and internal rules of individual schools. The maximum number of transferable credit hours shall be 60 ECTS. No grades will be assigned to transfer courses, only credits. The grades received at the previous institution(s) will not be calculated into student's grade point average.

3.2.3 Applicants listed in 3.2.2 must meet the entry requirements with the exception of cases when:

a) An applicant is a winner/prize winner of the International Subject Olympiads awarded by gold, silver and bronze medals for the last three years. In order to participate in selection competition these candidates must submit the results of IELTS or TOEFL test and be interviewed by the Admission Committee.
The International Subject Olympiads include International Mathematics Olympiad – IMO; International Physics Olympiad – IPHO; International Chemistry Olympiad – IChO; International Biology Olympiad – IBO; International Olympiad in Informatics – IOI; International Zhautykov Olympiad in Mathematics, Physics and Informatics; and International Mendeleyev Chemistry Olympiad;

b) An applicant is a winner/prize winner of the awarded by gold and silver medals for the current academic year. In order to participate in selection competition these candidates must submit the results of IELTS or TOEFL test and be interviewed by the Admission Committee.
The Republican Olympiads include Republican Mathematics Olympiad; Republican Physics Olympiad; Republican Chemistry Olympiad; Republican Biology Olympiad; and Republican Informatics Olympiad;

c) Applicants who have successfully completed at least one academic year of an undergraduate program at a university with English language as an official language of instruction and included into the list of top 200 universities according to the Times Higher Education World University or QS World University ranking at the time of application. These candidates are exempt from submitting test reports on ACT/SAT Reasoning Test and SAT Subject test as well as IELTS/TOEFL;

d) Applicants who have been studying in English last three years at a secondary school in a country with English as an official language or in an institution with English as a primary language of instruction are exempted from submission of IELTS/TOEFL certificates.

3.2.4 The minimum requirements for graduates of secondary school (or its foreign equivalent), students of the final year of secondary school (or its foreign equivalent) and higher education institution's students are as follow:

Minimum requirements for SAT Subject Test	Minimum requirements for IELTS and TOEFL	Minimum requirements for SAT Reasoning Test and ACT
SAT Subject Test – Math and Physics with at least 600 in each subject	IELTS – no less than 6.5 overall (with at least 6.0 in each sub-score) or TOEFL iBT = 79-93 or TOEFL PBT* = 574-599	SAR reasoning Test – no less than 1240 (starting from March 2016). Essay is required, no minimum score Or ACT – composite score no less than 27. Writing part is required, no minimum score

Note: *TOEFL PBT are admitted only from the international applicants from the countries where an official IELTS and TOEFL iBT are not available

3.2.5 The minimum requirements for graduates and current students of IB Diploma are as follow:

Minimum requirements for IELTS and TOEFL	Minimum requirements for IB DP scores
IELTS – no less than 6.5 overall (with at least 6.0 in each sub-score) or TOEFL iBT = 79-93 or TOEFL PBT* = 574-599	Not less than 30 total score and 4, 4, 5 for 3 subjects of HL

Note: *TOEFL PBT are admitted only from the international applicants from the countries where an official IELTS and TOEFL iBT are not available

3.2.6 The minimum requirements for scores for graduates and holders of NIS Grade 12 are as follow:

Minimum requirements for IELTS and TOEFL	Minimum requirements for NIS Grade 12 Certificate scores
IELTS – no less than 6.5 overall (with at least 6.0 in each sub-score) or TOEFL iBT = 79-93 or TOEFL PBT* = 574-599	Not less than ABB

Note: *TOEFL PBT are admitted only from the international applicants from the countries where an official IELTS and TOEFL iBT are not available

3.2.7 Internal Transfers between NU Schools:

After entering NU, students may discover that their initial choice of major does not correspond to their interests or intellectual abilities. Those students may seek to change their degree. NU supports these decisions by allowing internal transfers between undergraduate Schools.

Internal transfer students must bring along their educational transcripts to meet the Head of the Department which offers the program. An internal transfer student will only be accepted for transfer based on the decision of the Head of the Department which offers the program in the receiving School's. The course transfer information that details how previously completed courses will be assigned to the new degree plan must be determined if the applicant satisfies the transfer requirements. The internal transfer must be endorsed by the Dean of the receiving School. The transfer of student will become effective in the semester following approval of the application by the receiving School.

4. PROGRAM, COURSES, AND CREDITS

4.1 Program Specified Courses

Nazarbayev University has adopted the Bologna Accord and the School of Engineering therefore uses the European Credit Transfer System (ECTS). Most courses to be studied at Year 1, Year 2, Year 3 and Year 4 are of standard credit value carrying 6 ECTS each, except for some courses, such as Calculus 1, etc. which carry ECTS other than 6. A student is expected to spend about 25 to 30 hours of study per semester (inclusive of class contact and other study effort) for 1 ECTS. The following Table lists the subjects, their ECTS values, and the category they belong to (Compulsory, Optional, or Elective). All discipline-specific courses shown as compulsory are non-deferrable and must be taken in accordance to the progression pattern. The courses offered will be updated from time to time according to the need of society and the profession.

Students admitted to the program are required to complete a minimum of 248 or more ECTS to satisfy the degree requirements. However, they may choose to take additional courses beyond the basic requirements. Please refer to Section 24 for detailed information on the requirements for graduation.

Course Code	Course Title	ECTS	Comments	Category of Courses
A. Nazarbayev University Undergraduate Core Curriculum Requirements				
Communicate fluently in the English Language				
SHSS150	**Rhetoric and Composition**	6		Compulsory
SHSS210	**Technical Writing**	6		Compulsory
Demonstrate competence in the Kazakh Language				
Select 2 courses at appropriate level in Kazakh Language, Literature or Culture		12	Based on diagnostic test	Compulsory
Describe and interpret major events in Kazakh and Kazakhstani history				
HST100	History of Kazakhstan	6		Compulsory
Demonstrate knowledge of the natural and social sciences				
ECON323	Managerial Economics	6		Compulsory
PHYS161	Physics I for Scientists and Engineers	8		Compulsory
Apply numerical and digital literacy skills				
MATH161	Calculus I	8		Compulsory
ENG101	Programming for Engineers	6		Compulsory
Apply skills in business, design and entrepreneurial thinking				
	Fundamentals of Entrepreneurship and Management	6		Compulsory
Use research skills and methods to complete projects				
ENG100	Introduction to Engineering	6		Compulsory
Identify ethical and leadership issues and take appropriate leadership actions				
Select 1 among 3 SHSS offered courses on Ethics		6		Compulsory

Course Code	Course Title	ECTS	Comments	Category of Courses
B. Common/shared Courses				
ENG102	Engineering Materials I	6		Compulsory
PHYS162	Physics II for Scientists and Engineers	6		Compulsory
MATH162	Calculus II	8		Compulsory
ENG200	Differential Equations and Linear Algebra	6		Compulsory
ENG202	Numerical Methods in Engineering	6		Compulsory
ENG201	Applied Statistics	6		Compulsory
CEE201	Environmental Chemistry	6		Compulsory
ENG400	Capstone project	12		Compulsory
MAE 200	Structural Mechanics I			
MAE 300	Fluid Mechanics I			

Course Code	Course Title	ECTS	Comments	Category of Courses
C. Discipline-Specific Requirement				
CEE 200	Structural Mechanics I	6		
CEE 201	Environmental Chemistry	6		
CEE 204	Civil Engineering CAD and Surveying	6		
CEE 203	Structural Analysis	6		
CEE 202	Environmental Engineering	6		
CEE 300	Structural Design - Concrete	6		
CEE 302	Geotechnical Engineering	6		
CEE 304	Fluid Mechanics I	6		
CEE 306	Civil Engineering Materials	6		
CEE 301	Structural Design – Steel	6		
CEE 303	Geotechnical Design	6		
CEE 305	Hydraulics and Hydrology	6		
CEE 400	Transportation Engineering	6		
CEE 401	Construction Technology and Management	6		
D. Discipline-Specific Requirement (Specialization areas and electives)				
Structural Engineering				
CEE 450	Behavior & Design of Structural System			Elective
CEE 451	Prestressed Concrete Design			Elective
CEE 452	Advanced Structural Mechanics			Elective
ENG 300	Interdisciplinary Design Project			Elective
CEE 463	Individual Research Project in CE 1			Elective
CEE 464	Individual Research Project in CE 2			Elective

Course Code	Course Title	ECTS	Comments	Category of Courses
E. Discipline-Specific Requirement (Specialization areas and electives)				
Geotechnical Engineering				
CEE 453	Applied Soil Mechanics			Elective
CEE 454	Foundation Engineering			Elective
ENG 300	Interdisciplinary Design Project			Elective
CEE 463	Individual Research Project in CE 1			Elective
CEE 464	Individual Research Project in CE 2			Elective
Environmental Engineering				
CEE 350	Water & Wastewater Treatment Processes			Elective
CEE 455	Solid and Hazardous Waste Management			Elective
CEE 456	Membrane Separation Processes			Elective
CEE 457	Air Quality Management			Elective
ENG 300	Interdisciplinary Design Project			Elective
CEE 463	Individual Research Project in CE 1			Elective
CEE 464	Individual Research Project in CE 2			Elective
Construction Engineering and Management				
CEE 351	Application of Geomatics in CE			Elective
CEE 458	Modern IT in Construction			Elective
ENG 300	Interdisciplinary Design Project			Elective
CEE 463	Individual Research Project in CE 1			Elective
CEE 464	Individual Research Project in CE 2			Elective
				Elective
Water Resources Engineering				
CEE 459	Water Systems and Structures			Elective
CEE 460	Water Supply and Distribution Management			Elective
ENG 300	Interdisciplinary Design Project			Elective
CEE 463	Individual Research Project in CE 1			Elective
CEE 464	Individual Research Project in CE 2			Elective
Transportation Engineering				
CEE 352	Structure & Properties of Concrete Materials			Elective
CEE 461	Traffic Engineering and Management			Elective
CEE 462	Pavement Design and Performance			Elective
ENG 300	Interdisciplinary Design Project			Elective
CEE 463	Individual Research Project in CE 1			Elective
CEE 464	Individual Research Project in CE 2			Elective

4.2 Kazakh Language Policy Requirements

Beginning students will be given the stage 1, diagnostic KAZTEST during student orientation. This test will be administered to students free of charge. Based on the results of their diagnostic KAZTEST, students will be placed either in the basic, intermediate or advanced Kazakh courses. Every student must pass a minimum of 12 ECTS (two 6 ECTS courses) in the NU UG Core Curriculum at the appropriate level in Kazakh Language, Literature or Culture before graduation.

5. NORMAL PROGRESSION PATTERN

A student must obtain at least a D grade to pass a course.

Year 1	
Semester 1 (34 ECTS)	**Semester 2 (34 ECTS)**
SHSS 150 Rhetoric & Composition	HST 100 History of Kazakhstan
MATH 161 Calculus I	MATH162 Calculus II
PHY 161 Physics I for Scientists and Engineers	KAZ 121 Kazakh I (Upper-intermediate Kazakh)
ENG 100 Introduction to Engineering	ENG 102 Engineering Materials I
ENG 101 Programming for Engineers	PHYS 162 Physics II for Scientists and Engineers
Year 2	
Semester 1 (30 ECTS)	**Semester 2 (30 ECTS)**
ENG 200 Differential Equations and Linear Algebra	SHSS 210 Technical Writing
PHIL 210, 211, or 212 (Select 1 among 3 SHSS offered courses on Ethics)	ENG 201 Applied Statistics
CEE 200 / Structural Mechanics I	ENG 202 Numerical Methods in Engineering
CEE 204 Civil Engineering CAD and Surveying	CEE 203 Structural Analysis
CEE 201 Environmental Chemistry	CEE 202 Environmental Engineering
Year 3	
Semester 1 (30 ECTS)	**Semester 2 (30 ECTS)**
ECON 323 Managerial Economics	Fundamentals of Entrepreneurship and Management
CEE 300 Structural Design - Concrete	CEE 301 Structural Design – Steel
CEE 302 Geotechnical Engineering	CEE 303 Geotechnical Design
CEE 304/Fluid Mechanics I	CEE 305 Hydraulics and Hydrology
CEE 306 Civil Engineering Materials	Elective 1 or ENG 300 IDP
Year 4	
Semester 1 (30 ECTS)	**Semester 2 (30 ECTS)**
Kazakh II	ENG 400 Capstone Project
ENG 400 Capstone Project	CEE 401 Construction Technology and Management
CEE 400 Transportation Engineering	Elective 4
Elective 2	Elective 5
Elective 3	Elective 6

Total Number of Credits: 248 ECTS

Note 1: The study pattern for the courses is indicative only. Students may take these courses according to their own schedule. They are recommended to consult their Academic Advisor for guidance and planning if necessary.

6. CURRICULUM MAP

Alignment of Courses with Program Learning Outcomes:

	Program Learning Outcomes						
	1	**2**	**3**	**4**	**5**	**6**	**7**
A. NAZARBAYEV UNIVERSITY UNDERGRADUATE CORE CURRICULUM REQUIREMENTS[(1)]							
Communicate fluently in the English Language							
English (2 Courses)				X			X
Demonstrate competence in the Kazakh Language							
Kazakh (2 Courses)				X			
Describe and interpret major events in Kazakh and Kazakhstani history							
HST 100 History of Kazakhstan				X	X	X	
Demonstrate knowledge of the natural and social sciences							
Managerial Economics		X			X		X
PHYS161 Physics I for Scientists and Engineers	X	X	X				
Apply numerical and digital literacy skills							
MATH161 Calculus I	X					X	
Programming for Engineers	X	X				X	
Apply skills in business, design and entrepreneurial thinking							
Fundamentals of Entrepreneurship and Management				X	X	X	X
Use research skills and methods to complete projects							
ENG100 Introduction to Engineering	X	X	X	X	X	X	X
Identify ethical and leadership issues and take appropriate leadership actions							
Select 1 among 3 SHSS offered courses on Ethics				X			
B. COMMON/SHARED COURSES							
ENG101 Engineering Materials I	X		X			X	
PHYS161 Physics II for Scientists and Engineers	X	X	X				
MATH162 Calculus 2	X					X	
ENG200 Differential Equations and Linear Algebra	X	X	X				
ENG202 Numerical Methods in Engineering	X	X	X			X	
ENG201 Applied Statistics	X	X	X		X		
CEE201 Environmental Chemistry	X	X	X	X			
ENG400 Capstone project	X	X	X	X	X	X	X
Interdisciplinary Design Project	X	X	X	X	X	X	X

	Program Learning Outcomes						
	1	**2**	**3**	**4**	**5**	**6**	**7**
C. DISCIPLINE-SPECIFIC REQUIREMENTS (INCLUDING ELECTIVES)							
CEE 200 Structural Mechanics I	X		X				
CEE 201 Environmental Chemistry	X	X	X				
CEE 204 Civil Engineering CAD and Surveying	X	X	X	X			
CEE 203 Structural Analysis	X		X				
CEE 202 Environmental Engineering	X	X	X	X	X	X	X
CEE 300 Structural Design - Concrete	X	X	X			X	
CEE 302 Geotechnical Engineering	X		X	X			
CEE 304 Fluid Mechanics I	X		X				
CEE 306 Civil Engineering Materials	X	X	X		X	X	X
CEE 301 Structural Design – Steel	X	X	X			X	
CEE 303 Geotechnical Design	X	X	X			X	
CEE 305 Hydraulics and Hydrology	X		X				
CEE 400 Transportation Engineering	X		X			X	
CEE 401 Construction Technology and Management	X	X	X		X	X	
Behavior & Design of Structural System	X	X		X		X	
Prestressed Concrete Design	X		X		X		
Advanced Structural Mechanics	X		X				
Applied Soil Mechanics	X		X		X		
Foundation Engineering	X	X	X			X	
Water & Wastewater Treatment Processes	X	X					X
Solid and Hazardous Waste Management	X	X	X			X	X
Membrane Separation Processes	X	X	X	X	X	X	X
Air Quality Management	X		X		X		
Application of Geomatics in CE	X	X	X				
Modern IT in Construction	X		X		X		
Water Systems and Structures	X	X					
Water Supply and Distribution Management	X	X			X		
Structure & Properties of Concrete Materials	X	X	X	X		X	X
Traffic Engineering and Management	X	X	X		X		
Pavement Design and Performance	X	X	X				
Individual Research Project in CE 1	X	X	X	X	X	X	X
Individual Research Project in CE 2	X	X	X	X	X	X	X

7. CAPSTONE PROJECT

The Capstone Project is a 2-semester common course for all engineering programs which spans across the fall and spring semesters of the same academic year. The importance of the Capstone project is reflected in the total number of credits it carries, being 12 ECTS which are equivalent to two standard-sized courses.

One of the important features of the Capstone Project is “learning by doing”. It is intended to be a platform for the students to develop their intellectual and innovative abilities and to give them the opportunities to integrate and apply the knowledge and analytical skills gained in previous stages of study. It should also provide students with opportunities to develop their problem-solving skills and communication skills. The process from concept to final implementation and testing, through problem identification and the selection of appropriate solutions will be practiced by the students.

7.1 Capstone Project Management

Normally a group of students will be assigned one project under the supervision of an academic staff member so that they will work independently and collaboratively to achieve the project objectives. Students may work on different aspects of a project. The group size may increase for a larger-scale project or a more complex project.

The assignment of projects is expected to be completed at the beginning of the fall semester in the final year of study. Guidelines for Capstone Project are given to students at the beginning of the final year.

7.2 Capstone Project Assessment

Assessment of the Capstone Project focuses in three main areas: project reports, oral presentations and work done over the whole project period. Assessment will be done by a team of staff including the project supervisor.

8. DEPARTMENTAL BEng. PROGRAM COMMITTEE

8.1 The composition of the Departmental BEng. Program Committee is decided by the Head of Department with the approval of the Dean. The Committee is responsible for program performance monitoring, review, and enhancement.

8.2 The Departmental BEng. Program Committee will regularly collect the course portfolios, program statistics and conduct surveys of students and other key stakeholders on the relevance, delivery, quality and the standards of the courses. The Committee will analyze the collected data and recommend areas for improvement taking into consideration the adequacy of resources, learning and teaching approaches, best practices, as well as the local and global trends. The Committee will also oversee the implementation of recommendations to improve the program.

8.3 The Departmental BEng. Program Committee is responsible for the program portfolio for each academic year including the annual program monitoring report.

9. STUDENT STATUS, ACADEMIC CALENDAR, POLICIES AND PROCEDURES

The program currently only accepts full-time students.

The program operates on the basis of an academic year divided into three academic periods: the regular fall and spring semesters and a summer term (if offered). Depending on public holidays, the fall semester and spring semester should have up to fourteen weeks for studies with two weeks for end-of-semester examinations. The School does not normally offered summer terms. Summer terms at NU are generally eight weeks.

The official NU Academic Calendar, Course Schedules, Final Examinations Schedule, and Policies and Procedures are available online at the Office of the Registrar website (https://registrar.nu.edu.kz/). It is the responsibility of the students to familiarize themselves with the following Policies and Procedures:

1) Academic Policies and Procedures for Undergraduate Programs
2) Regulations on Leave of Absence for Undergraduate and Foundation Year Program
3) Policy and Procedures on the Fifth Year of Undergraduate Study
4) Undergraduate Attendance policy and Procedures
5) Regulation on Dismissal and Voluntary Withdrawal for Undergraduate and Foundation Year Program Students
6) Graduation policy and Procedure for Undergraduate and Graduate Programs

Induction and orientation week takes place at the beginning of the fall semester to allow new students to adapt to the program requirements. New students are expected to familiarize themselves with the layout of the buildings, location of the staff offices, lecture theatres, laboratories, and other teaching facilities during the orientation.

10. COURSE REGISTRATION AND WITHDRAWAL

10.1 In addition to program registration, students need to register for courses at specified periods prior to the commencement of a semester. NU has an online course registration system. Students are notified by email from the Office of the Registrar of the dates for the registration period.

10.2 NU uses a priority registration system that ensures students in their last year of undergraduate study will have the first opportunity to register for classes. Students are notified, via email from the Office of the Registrar, of the dates for the registration period.

10.3 A student is waitlisted when the course they have attempted to register for is full. When a place in the course becomes available the top student in the waitlist is registered in the course and notified by email. Once the waitlist period ends, the student will have time to register for alternate courses before the end of the "add" deadline. Students must register for courses by the end of the first week of class in the fall or spring semester, and by the end of the second day of classes during the summer term (if offered).

10.4 An add/drop period will also be scheduled by the Office of the Registrar for each semester and during the summer term (if offered). The add/drop period can be found in the Academic Calendar. For courses not available for online registration, students must complete the add/drop form available from the Office of the Registrar.

10.6 Students who failed to attend the first week of any class for which they have completed registration and appear on the class roster can be dropped from the course by the administrators.

10.7 Students may apply for withdrawal of their registration on a course after the add/drop period, if they have a genuine need to do so. The application should be made on the Course Withdrawal form available from the Office of the Registrar. The course withdrawal deadline can be found in the Academic Calendar.

10.8 The pre-requisite requirements of a course must have been fulfilled before a student registers for that course. However, the pre-requisite requirements of a course can be waived under exceptional circumstances by submitting a completed Requisite override form available from the Office of the Registrar. If the pre- requisite course concerned forms part of the requirements for award, the course has to be passed in order to satisfy the graduation requirements for the program concerned, despite the waiving of the pre-requisite.

11. STUDY LOAD

11.1 For students following the progression pattern specified for their program, they have to take the number of credits and courses, as specified in this Program Handbook, for each semester. Students cannot drop those courses assigned by the department unless prior approval has been given by the department.

11.2 The normal study load is about 30 ECTS credits in a regular fall or spring semester. The maximum study load to be taken by a student in a regular fall or spring semester is 36 ECTS credits, unless exceptional written permission is given by the Dean and from the Vice-Provost for Academic Affairs. The maximum study load to be taken by a student in a summer term (if offered) is 12 ECTS credits, unless exceptional written permission is given by the Dean and from the Vice-Provost for Academic Affairs. For such cases, students are reminded that the study load approved should not be taken as grounds for academic appeal.

11.3 The minimum load for a full-time student in any given regular fall or spring semester is 24 ECTS credits of coursework that count toward graduation. Under exceptional circumstances, a student may be permitted to enroll for fewer than 24 ECTS credits if written permission is received from the Dean and from the Vice-Provost for Academic Affairs.

11.4 To help improve the academic performance of students on academic probation (the meaning of “academic probation” can be found in Section 19.2), these students will not be allowed to take 36 ECTS or more during their probation period in the fall and spring semesters.

11.5 Students who have obtained approval to pace their studies and students on program without any specified progression pattern who wish to take more than the normal course load in a fall or spring semester should seek advice from the Department concerned before the selection of courses.

11.6 Students are required to be present at the beginning of the semester and to remain until the semester is completed.

12. COURSE EXEMPTION AND CLASS ATTENDANCE

There is no course exemption policy for this program. In exceptional cases, students may substitute courses in the curriculum (including the mandatory Nazarbayev University Undergraduate Core Curriculum Requirements' courses) with other courses, if written permission is given by the Head of Department and the Dean.

12.1 All students are expected to attend all classes at the University. Penalties as stated in the course policies will be applied if attendance falls below 80% of scheduled classes. At the start of the semester, each instructor is responsible for clearly communicating the course attendance policies and/or School attendance policies. Faculty has right to lower grades or initiates a drop/withdrawal from a course if there is a violation of the attendance policies. Students should be mindful of the course policies and make sure they completely understand the consequences of missing classes (either excuse or unexcused).

12.2 Excused absence is when a student misses classes for one of the following documented reasons: personal illness; family emergency; school approved absence such as conference, Olympiad, or other academic events. All medical certificates must be endorsed by the NU doctors and recorded by the Department of Student Affairs. Only the instructors may approve a student's request to be absent from class. Students should get the appropriate "excuse" forms available from the School Office and submit the completed forms to each course instructor for approval for each missed class. In the event of a dispute, the matter may be reported to the Vice dean for Academic Affairs or equivalent official of the School. The determination of the Vice Dean or equivalent School official shall be final.

12.3 Unexcused absence occurs when a student deliberately misses a class with no reasons.

12.4 Students are responsible for monitoring their own attendance. Students who exceed the maximum number of absences in the current and previous semester will not be eligible for University sponsored study abroad programs or University sponsored events.

13. CREDIT TRANSFER

13.1 Students may transfer credits for recognized previous studies which will be counted towards meeting the requirements for award. Transferred credits may be counted towards more than one award. The granting of credit transfer is a matter of academic judgment. The student should provide a detailed course syllabus showing the topics covered and assessment tasks which were completed for each course and a certified official transcript with the number of credits and the grade or final assessment in the course. Unless the course is a language course all language of instruction must be in English. To ascertain the academic standing of the institution offering the previous studies, the Department might need to request the institutions concerned to provide more information.

13.2 Transfer credit is not given for courses in which the student earned lower than C grade (or its equivalent). Grades earned at other universities are not included in computing the student's CGPA at NU. All transfer credits will be annotated as such on the student's NU transcript.

13.3 The maximum number of transferable credits is 60 ECTS credits. Discretion may be made with approval of the Dean for a student who was on an approved Academic Mobility program.

13.4 Certain types of credit cannot be transferred to the NU, including but not limited to the credits awarded by higher education institutions for noncredit courses, workshops, and seminars offered by other higher education institutions as part of continuing education programs.

13.5 The transfer decision and final judgement are made by the relevant Department or if there is no relevant Department by the School. The School will decide the number of credits to be transferred, and if appropriate the level of the course and the course equivalent.

13.6 Transfer credits at the time of admission can only be granted for courses taken in the preceding two academic years.

13.7 Credit for courses taken at institutions outside NU subsequent to admission can only be granted by prior written approval from the relevant Department, or if there is no relevant Department from the School Admissions Committee.

13.8 Credits earned in other higher education institutions during the time spent at NU shall be processed in accordance with appropriate internal regulations of NU.

13.9 Credit transfer can be applicable to credits earned by students through studying at an overseas institution under an approved Academic Mobility program. Students should, before they go abroad for the approved Academic Mobility program, seek prior approval from the program offering Department (who will consult the course offering Departments as appropriate) on their study plan and credit transferability. As with all other credit transfer applications, the Departments concerned should scrutinize the syllabuses of the courses which the students are going to take at the overseas institution, and determine their credit transferability based on academic equivalence

with the corresponding courses on offer at the NU, and the comparability of the grading systems adopted by NU and the overseas institution. The transferability of credits and the suitability for allowing grades to be carried over must be determined and communicated to students before they go abroad for the approved Academic Mobility program.

13.10 For credit transfer of retaken courses, the grade attained in the last attempt should be taken in the case of credit transfer with grade being carried over. Students applying for credit transfer for a course taken in other institutions are required to declare that the course grade used for claiming credit transfer was attained in the last attempt of the course in their previous studies. If a student fails in the last attempt of a retaken course, no credit transfer should be granted, despite the fact that the student may have attained a pass grade for the course in the earlier attempts.

13.11 Students will not be granted credit transfer for a course which they have attempted and failed in their current study.

14. LEAVE OF ABSENCE

Periods of time during which a student is on an approved leave of absence from the University shall not be included in the calculation of time limitations for stipends. When granting a leave of absence to a student, whose tuition is funded through the state or University, his/her right for an educational grant will be retained. Funding and tuition fees will be paused for the period of the leave of absence, except for funding of stipends, which are established by the procedures of the paying state stipend to the students who have been granted a leave on medical grounds. The funding and tuition fees will be resumed after the end of a leave of absence.

A leave of absence will not be considered for approval in the following cases:

1) If the application is submitted during the examination period;
2) If a student has been scheduled for dismissal in the light of poor academic performance, inadequate progress toward degree, or for disciplinary reasons.

If a student has an outstanding “Incomplete” at the time he or she is granted leave of absence, the period for completion of that “Incomplete” may be extended for the period of the leave of absence with the written approval of the faculty member who granted the “Incomplete” and the Dean.

A student who requests a leave of absence shall submit an application form provided by the Office of the Registrar. A leave of absence may be granted by the Dean, the Vice President for Student Affairs, and the Vice Provost for Academic Affairs. The student's leave of absence will become effective upon the Provost's signature of the order, which shall indicate the dates of beginning and termination of the leave of absence and its grounds. Copy of the order is given to the student, along with a document stating their academic status at the time of leaving and the conditions they will be under upon their return from leave of absence. If the student was enrolled in classes prior to the approval of the leave of absence, no grades will be awarded for the interrupted semester and all courses will be marked with a "Withdrawal" ("W"). The grant of the a leave of absence will be recorded on the student's transcript.

14.1 Leave of Absence - Medical.

Students may request for leave of absence when extraordinary circumstances such as illness or injury prevent the student from continuing classes and incompletes or other arrangements with the instructors are not possible. Medical leave of absence policy covers both physical and mental health conditions, including pregnancy and maternity.

A leave of absence can be granted to a student on the grounds of a medical certificate confirmed by a qualified medical officers consulting commission created in accordance with legislation of the Republic of Kazakhstan for a period from 6 to 12 months, except that in the case of tuberculosis a leave may be granted for a period of 1 to 2 years and in the case of maternity a leave of absence may be granted for a period of up to 2 years. A second leave of absence on medical grounds shall not be granted to a student. A student may request a leave of absence on medical grounds by submitting an application to the Department of Student Affairs for validation, along with an original medical certificate issued by the Medical Authority. When returning from a leave of absence granted on medical grounds a student shall submit an application to the Office of the Registrar no less than 20 working days prior to beginning of the academic period they wish to return, and in cases other than pregnancy/maternity leave, he/she will submit a medical certificate of an appropriate Medical Authority approving the student's return to the University. Students returning from pregnancy/maternity leave shall submit birth certificate of the child or other relevant document(s).

14.2 Leave of Absence - Immediate Family Member.

Students may be granted for leave of absence based on change in social or economic status affecting an immediate family member (immediate member means a parent, spouse, dependent child, sibling, or grandparent). In order to grant a leave of absence based on circumstances of an immediate family member, the University may request to present evidence of a direct impact on the student's ability to continue with his or her program of study. If requested, such evidence shall be submitted to the Dean, who shall review and forward copies of such documentation to the Vice President for Student Affairs and International Cooperation and the Vice Provost for Academic Affairs. When returning from a leave on non-medical grounds a student shall submit an application to

the Office of the Registrar not less than 45 days prior to the beginning of the semester in which they wish to return.

14.3 Leave of Absence - Other.

A student may be granted a leave of absence from the University for a period of up to one year for reasons other than a medical condition or event affecting an immediate family member if the following conditions met:

1) No leave of absence may be granted under this section for any undergraduate student prior to the completion of the first year of his or her studies;
2) No leave of absence may be granted under this section for any student who is currently on probation, and has had Category B disciplinary actions;
3) No leave of absence may be granted under this section for any student who is behind in credit hours;
4) A leave of absence under this section shall be granted only to a student with high academic performance GPA 3.0 and above;
5) A leave of absence under this section will be granted only on a determination by the Dean that such leave will not be detrimental to the student's ability to complete the program.

To apply for a leave of absence under this section, a student is required to submit documentation demonstrating the purpose of the leave and the activities in which he or she expects to participate during the leave period. In the event that a proposed leave includes a period of employment with a company, the supporting documentation submitted in advance must include a letter of invitation from the employing company and a copy of the corporate registration or other documentation of the company's operations. When returning from a leave on non-medical grounds a student shall submit an application to the Office of the Registrar not less than 45 days prior to the beginning of the semester in which they wish to return. At the end of the leave period, the student will be required to submit a report detailing his or her activities during the leave period to the Dean and a letter from a supervisor or equivalent individual(s) attesting to the accuracy of the student's report and evaluating the student's performance during the leave period. In the event the student's activities during the period of leave include employment, he or she is required to submit relevant documentation demonstrating uninterrupted employment for the prescribed period. Violation of the terms of this section will be treated as non-academic misconduct under the University's Student Code of Conduct and Disciplinary Procedures.

15. PRINCIPLES OF ASSESSMENT

15.1 Assessment of learning and assessment for learning are both important for assuring the quality of student learning. Assessment of learning is to evaluate whether students have achieved the intended learning outcomes of the courses that they have taken and have attained the overall learning outcomes of the academic program at the end of their study at a standard appropriate to the award. Appropriate methods of assessment that align with the intended learning outcomes will be designed for this purpose. The assessment methods will also enable teachers to differentiate students' different levels of performance within courses. Assessment for learning is to engage students in productive learning activities through purposefully designed assessment tasks.

15.2 Assessment will also serve as feedback to students. The assessment criteria and standards will be made explicit to students before the start of the assessment to facilitate student learning, and feedback provided will link to the criteria and standards. Timely feedback will be provided to students so that they are aware of their progress and attainment for the purpose of improvement.

15.3 The course results based on the assessments are examined by the Exam Board at the end of each semester. The Exam Board will review, discuss and finalize progression and completion.

16. ASSESSMENT METHODS

16.1 Students' performance in a course can be assessed at the discretion of the course coordinator by a variety of assessment activities, including examinations, tests, assignments, projects, laboratory work, field exercises, presentations and other forms of classroom participation. Assessment activities which involve group work should include some individual components therein, i.e. the contribution made by each student in a group effort shall be determined and assessed separately, and this can result in different grades being awarded to students in the same group.

16.2 The course learning outcomes, assessment activities, and the weighting of each activity in the overall course grade will be clearly stated in the course specifications. The course learning outcomes should be assessed by appropriate assessment activities, in line with the outcome-based approach.

16.3 At the beginning of each semester, the course coordinator will inform students of the details of the methods of assessments to be used within the assessment framework as specified in the course specifications.

16.4 Students who did not participate in assessment activities will be awarded zero mark. When there are extenuating circumstances, the students must provide documentary evidence and apply for excuse absence (refer to Section 12). Depending on the circumstances, the course instructor may for cases of approved excused absence:

1) Set a new date (or deadline) for the students to retake or submit the missed assessment activity;

2) Decide on alternative means to compensate for the missed assessment activity.

Applications for excuse absence so that students can participate in missed assessment activity will not be accepted 7 calendar days after the original assessment activity date.

16.5 Course instructors have the right not to accept and/or deduct marks for late submission of assessment elements. These course policies should be stated in the course specifications. At the beginning of each semester, the course coordinator must inform students of the course policies.

17. COURSE RESULTS

17.1 Course instructors, in respect of the course they teach, have sole responsibilities for marking and grading students' coursework and examinations scripts. Assessment elements (including final examinations) will be graded by a clear marking scheme (set by the course instructor) which is non-negotiable. Timely feedback of assessment will be given to students as soon as possible (e.g. not later than a month), and in any case, before the final examination/assessment. In this regard, course instructors will be accountable to the Head of Department, to ensure that all forms of assessment, including the students' coursework and examination scripts, are correctly marked and graded where appropriate. Course instructors will avoid administrative errors at all times, and submit the grades to the Office of the Registrar according to the schedule set in the academic calendar. To ensure consistency and uniformity for a common course taught by different course instructors, meetings can be arranged amongst them before the examination papers are set or before the marking is done.

17.2 Course grades should be reviewed and finalized by the Department before being formally released to students and submitted to the Exam Board.

18. BOARD OF EXAMINERS

18.1 The authority for approving the overall results of students rests with the Exam Board. The Exam Board will meet at the end of each semester (except for Summer Term - students who are eligible to graduate after the completion of Summer Term courses will be processed in the beginning of the fall semester). The Exam Board is responsible for making:

(i) A decision on the classification of awards to be granted to each student on completion of the program;

(ii) A decision on progression, academic probation, and dismissal cases; and

(iii) A decision on cases with extenuating circumstance.

18.2 These decisions are made by the Exam Board at the end of each semester in the light of the standard of student achievement appropriate to the award to which the program is designed to lead, the aims of the program, the students' performance on the program in previous years, the general assessment regulations of the University, the specific program regulations, and good practice established in the University and elsewhere.

18.3 The Exam Board will not attempt to change the grades for any student in any course nor condone failures.

18.4 Students shall be formally notified of decisions affecting them after the Exam Board meeting except for those whose cases require endorsement by the Provost Office.

19. PROGRESSION / ACADEMIC PROBATION / DISMISSAL

19.1 The Exam Board shall, at the end of each semester (except for Summer Term - students who are eligible to graduate after the completion of Summer Term courses will be processed in the beginning of the fall semester), determine whether each student is

(i) Eligible for progression towards an award; or

(ii) Eligible for an award; or

(iii) Required to be dismissed from the program.

19.2 At the conclusion of every semester, each student's Grade Point Average (GPA) (see Section 23) and rate of progress toward degree are calculated by the Office of the Registrar and academic standing is determined for students seeking Bachelor degrees according to the following criteria:

1) Good Academic Standing – A student having a Cumulative Grade Point Average (CGPA) of 2.0 or above and a GPA in the current semester of 2.0 or above is considered to be in good academic standing;

2) Academic warning – A student will receive notice of academic warning if his/her academic performance is deemed to be unsatisfactory. A student may receive an academic warning after the mid-semester status reports, which are required from all course instructors in all courses to help identify and assist students who may need additional guidance (Mid-semester grading will be based on Satisfactory (S) – i.e. A student who is at a minimum C or above with excellent attendance; or Non Satisfactory (NS) – i.e. Any student who is at a C- or below with attendance problems, and other problems that may keep the student from successfully completing the courses. Notification of academic warning will be sent by the Office of the Registrar to the student, the School's Vice Dean of Academic Affairs and the student's advisor. A student will be advised to limit their social activities and may not be considered for NU sponsored travel.

3) Academic probation – A student who fails to maintain Good Academic Standing based on GPA will be placed on Academic Probation. At the end of one semester of academic probation, students are subject to dismissal from NU if they have not achieved the necessary conditions to return to Good Academic Standing. In exceptional cases, the Dean may recommend to extend academic probation for a second semester based on evidence of improvement, overall academic progress, the student's potential to return to Good Academic Standing and eventually to graduate on time. The recommendations must be submitted to the Vice Provost for Academic Affairs indicating the grounds for the recommendation. The final decision on extension of the academic probation for another semester is made by the Vice Provost for Academic Affairs. Under no circumstances may a student be on academic probation more than two consecutive semesters or for more than three semesters in total.

19.3 Grades received during Summer Term may also affect a student's academic standing.

19.4 The Dean will receive a probation report at the end of each semester from the Office of the Registrar. Students will receive notification from the Office of the Registrar informing them

of any change in their academic standing

19.5 Students are required to remain for four years of study as an undergraduate student to ensure they graduate pursuant to graduation requirements as specified in the internal regulations of NU.

19.6 NU expects students to complete their degree requirements within four years (subject to the Policy on Fifth Year Study and other internal regulations of NU). To complete a degree in four years, students must average 30 ECTS per semester (including transfer credits and summer courses). Any students who falls 30 or more ECTS credits behind this rate of completion will be subject to dismissal from NU. The Office of the Registrar shall submit a list of students who are 30 or more ECTS credits behind satisfactory progress toward satisfactory progress toward a degree to the Dean, who shall make a recommendation to the Provost. The total credits are tallied by counting all credits earned from coursework as well as credits transferred into NU. Attempted credits are calculated by tallying the credits for every course on a student's transcript including transfer credit, graded courses, and courses that were graded AW, W, F, or I.

19.7 Students may be considered for the fifth year of study if they are unable to meet graduation requirements by the end of the last semester of their final year and are expected to be able to complete their degree with one additional year of study. At the end of the spring semester, as soon as is practicable after the receipt of final grades, the Office of the Registrar will send each School a list of the fourth year students who will not satisfy the requirements for graduation. The Vice Dean for Academic Affairs or equivalent in each School, in consultation with academic advisors and Department Chairs, will complete a form indicating the specific courses in which the student is to be enrolled during his or her fifth year. This form must be submitted to the Office of the Registrar by the stipulated deadline. The Office of the Registrar shall send a letter to the student's parent informing them that the student is eligible for a fifth year of study at cost, identifying the list of courses in which the student will be required to enroll during a fifth year of study, and indicating the current cost per credit of fifth year study at the University. The letter will contain an acceptance form. Upon timely return of the acceptance form the student will be enrolled as a fifth year student in the specific courses indicated in the letter. When the student is enrolled, the Office of the Registrar shall forward a copy of the letter and the acceptance form to the Bursar's Office. The Bursar's Office shall generate a billing statement and payment contract which will be send to the student. The Bursar's Office shall be responsible for the execution and registration of the contract. When the contract is executed, the Bursar's Office will send it to the Office of the Registrar for inclusion in the student's permanent file. A student enrolled into a fifth year will receive an academic schedule for each semester of the fifth year based on the list of required courses identified in the letter from the Office of the Registrar. The fifth year student is not allowed to change this schedule, drop or add courses, or withdraw from this set schedule. All academic requirements for graduation must be completed within the fall and spring

semester of the fifth year. A sixth year will not be considered under any circumstances. If a student has not completed their program of study by May of the fifth year, they will not graduate from the University or receive a diploma. They will receive a letter of attendance on approved letterhead. The school will ensure that each fifth year student meets regularly with their academic advisor. During their fifth year of study, fifth year student may be provided with accommodation on campus, depending on availability. Fifth year students will be charged an accommodation fee if they choose to live on campus.

20. APPEAL OF GRADES

All students have the right to appeal any grade that they have received that they believe is in error. The error must be based on one of the following criteria:

1) Error in calculation
2) Error in application of the class grade policy as presented in the course specifications
3) Incorrect entry of the grade into the database
4) Incomplete marking of an assessment

In the case of an exam, a student must first consult with the course instructor as soon as the grade is available and announced to the students. The student should review his or her corrected, graded final exam in the presence of a faculty within the stipulated period set by the course coordinator. No viewing is allowed after the stipulated period. If any error is found, the student should complete a “Grade appeal” form and submit it to the course coordinator. The School will set the official deadline for the appeal process. Late appeals will not be accepted.

Upon receipt of the “Grade appeal” form, the course coordinator can accept or deny the request. If there is insufficient ground for the grade appeal, the instructor can deny the request. However, if a student’s grade has been assigned incorrectly due to technical or procedural error, or miscalculation of grade, the course coordinator should complete a “Grade change” form from the Office of the Registrar. This form must be signed by the course instructor and the Dean. No grades can be changed after a degree has been granted.

If a student is dissatisfied with the outcome from the course coordinator, he or she may appeal to the Dean or Vice Dean, who shall consult with the course coordinator before making a decision. The decision of the Dean or Vice Dean shall be final. All grade changes must be resolved by the end of the first week of the next semester.

21. RETAKING OF COURSES

21.1 Any student who receives a grade that would prevent academic progress in his or her program of study may enroll to retake that course. The total number of times a student may retake a course is limited to three retake attempts. Students are not permitted to retake a course if it has already been passed for the purpose of improving the awarded grade.

21.2 All retake attempts will remain in the student record and on the transcript, and will be counted to semester's GPA, semester CPGA, semester's earned credits, semester's attempted credits and total attempted credits. Only the last retake will be counted in the final CGPA and total earned credits.

21.3 The summer term is short and the instructors of courses if offered can decide on the course policy, mode of delivery, and assessment requirements. If retake courses are offered in the summer term, a student cannot participate in more than two retake courses.

22. EXCEPTIONAL CIRCUMSTANCES

Absence from an assessment component

22.1.1 Students who are absent without permission from any form of assessment or who do not submit coursework for assessment will be awarded a mark of zero for that assessment unless the course instructor determines that there are extenuating circumstances. When there are extenuating circumstances, it is the student responsibility to provide documentary evidence in accordance to established University and School procedures and inform the course instructors as soon as possible prior to the assignment of the final grades. Depending on the circumstances, the instructor may set a new date for the students to resubmit or retake the missed assessments (refer to Section 16).

22.1.2 All medical documents must be verified by the NU doctors and endorsed by the Department of Student Affairs.

22.1.3 Any student who cannot take the examination as scheduled is required to submit his/her application for late assessment in writing to the Head of Department offering the course, within five working days from the date of the examination, together with any supporting documents. Decisions of applications for late assessment and the means for such late assessments shall be made by the Head of Department after consultation with the course coordinator.

Assessment to be completed (Incomplete grade)

22.2 When a student has completed a substantial portion of the requirements for a course but, due to extenuating circumstances, is unable to complete all requirements, the course instructor may assign a temporary grade of "Incomplete". An "Incomplete" grade can be given only on the basis of a written prior agreement between the student and the instructor and approved by the Head of Department and the Dean. The agreement will describe the additional work that is expected and the terms under which it is to be completed. The date for completion of work is to be determined by the course instructor, but all work is to be completed no later than the end of the following semester (including summer semester if appropriate)

22.3 When the work or examination that is required under an "Incomplete" agreement is completed, the course instructor shall request a change of the "I" grade to the appropriate grade for the course, at which time the grade of "I" will be removed from the student's transcript.

22.4 An "I" grade can also be applied to a student who cannot take part in a final examination in a course because of personal health problems, or that of immediate family. A new deadline will be set by the course instructor for the completion of the final examination.

22.5 An "I" has no grade points and is not included in the calculation of GPA.

22.6 A grade of Incomplete that is not completed by the end of the subsequent semester automatically reverts to the grade indicated in the agreement between the course instructor and the student. If no grade is indicated in the agreement and the instructor does not submit a change of grade request, the "Incomplete" grade will revert to an "F". In no case shall a student be granted a degree while there are unresolved Incompletes in the student's record.

Withdrawal

22.7 Withdrawal from courses will be permitted up to the date indicated in the Academic Calendar for the year in which the withdrawal occurs. A student will not be allowed to withdraw from a course in which he/she had taken a grade of "W" in a previous semester.

22.8 A withdrawal from a course is effective upon the student's submission of a completed Withdrawal Form to the Office of the Registrar.

22.9 A student who takes a Leave of Absence during a semester will automatically be withdrawn from all courses.

Other particular circumstances

22.10 A student's particular circumstances may influence the procedures for assessment but not the standard of performance expected in assessment.

23. GRADING

23.1 Assessment grades shall be awarded on a criterion-referenced basis. The following Common Grading Scale is applied to all NU undergraduate programs:

Letter grade	***%***	***Quality Point***	***Explanation***
A	95-100	4	Excellent, exceeds the highest standards in the assignment of course
A-	90-94.9	3.67	Excellent, meets the highest standards for the assignment or course
B+	85-89.9	3.33	Very good, meets the high standards for the assignment or course
B	80-84.9	3.00	Good, meets most of the standards for the assignment or course
B-	75-79.9	2.67	More than adequate; shows some reasonable command of the material
C+	70-74.9	2.33	Acceptable; meets basic standards for the assignment or course
C	65-69.9	2.00	Acceptable; meets some of the basic standards for the assignment or course
C-	60-64.9	1.67	Acceptable; while falling short of meeting basic standards in several areas
D+	55-59.9	1.33	Minimally acceptable; falling short of meeting many basic standards
D	50-54.9	1.00	Minimally acceptable; lowest passing grade
F	0-49.9	0	Failing; very poor performance

'F" is a course failure grade, whilst all others ('D' to 'A') are course passing grades. No credit will be earned if a course is failed.

Semester GPA

23.2 At the end of each semester, a semester Grade Point Average (GPA) will be computed based on the grade point of all the courses taken in the semester. For each course, the grade point is determined by multiplying the number of credits with the numeric quality point based on the obtained grade for that course. The sum of the grade points is then divided by the total credits for all the courses taken in the semester as follows:

$$\text{GPA} = \frac{\sum_{n} \text{Course Credit Value} \times \text{Course Quality Point}}{\sum_{n} \text{Course Credit Value}}$$

where *n* = number of courses (inclusive of failed courses) taken by the student in the semester.

In addition, the following courses will be excluded from the semester GPA calculation:

(i) Transferred courses
(ii) Incomplete courses
(iii) Withdrawn courses

Figure 1: example of the semester GPA calculation

Courses	**Credits (ECTS)**	**Letter Grade**	**Quality Point**	**Credit value multiply by Quality Point**
Course 1	8	A	4.00	8X4=32
Course 2	6	B+	3.33	6X3.33=19.98
Course 3	6	C-	1.67	6X1.67=10.02
Course 4	6	F	0	6X0=0
Course 5	6	B	3.00	6X3=18.00
	Total = 32			Total = 80
Semester GPA =				80/32 = 2.5

23.3 GPA's will be calculated for each Semester including the Summer Term. This Semester GPA will be used to determine students' eligibility to progress to the next Semester alongside with the 'cumulative GPA'. The Semester GPA calculated for the Summer Term will also be used for this purpose

Annual GPA

23.4 At the end of each academic year, an annual Grade Point Average (GPA) will be computed based on the grade point of all the courses taken in the academic year (excluding the summer term). For each course, the grade point is determined by multiplying the number of credits with the numeric quality point based on the obtained grade for that course. The sum of the grade points is then divided by the total credits for all the courses taken in the academic year.

In addition, the following courses will be excluded from the yearly GPA calculation:

(i) Transferred courses
(ii) Incomplete courses
(iii) Withdrawn courses

23.5 GPA's will be calculated for each academic year excluding the Summer Term. This annual GPA will be used to determine Dean's list. Students who have taken at least 60 ECTS and obtained an annual GPA of greater or equal to 3.8 based on the fall and

spring semesters grades in the academic year and did not have any misconduct will be recommended for the Dean's lists, which are commendations to undergraduate students of excellence.

Cumulative GPA

23.6 At the end of every semester, a Cumulative Grade Point Average (CGPA) will be computed based on the grade point of all the courses taken from the start of the program in residence at the University (including the summer term). For each course, the grade point is determined by multiplying the number of credits with the numeric quality point based on the obtained grade for that course. The total cumulative grade points are then divided by the total graded credits for all the courses taken from the start of the program in residence at the University.

23.7 For courses which have been retaken, only the grade point obtained in the final attempt will be included in the CGPA calculation. The CGPA is an indicator of overall performance at graduation, and is capped at 4.0.

Administrative Grades

23.8 The following University-wide administrative grade notations apply to all undergraduate programs:

Grades	Comments
P/F	A grade of P (pass) or F (Fail) may be reported for students who are permitted to take a course on a P/F grading basis rather than receiving a letter grade. Classes may only be taken on a P/F basis with the approval of the course instructor and the Dean. A "P" will not be used in calculating the student's GPA or CGPA; an "F" grade will be used in calculating the GPA and CGPA. The pass is equivalent to a C- or above
AU	Audited courses are recorded on the transcript with the notation "AU". Audited courses are not included in the calculation of the GPA, attempted credit, or earned credit. The grade "AU" is automatic. The course instructor cannot assign any other grade. Audited courses do not receive credit, cannot be counted towards graduation requirements, do not satisfy prerequisites and cannot be transferred.
I	Incomplete
IP	This grade is assigned at the end of the first term of a year-long class if the student has made adequate progress up to that point. It will be changed to reflect the class grade for both semesters of study at the end of the year.
W	Withdrawal
AW	Administrative Withdrawal. This grade indicates that a student has been ordered withdrawn from a course based on: • Disciplinary grounds, following the procedures and standards specified in the internal regulations of NU • Non-payment of tuition where appropriate following the procedures and standards specified in the internal regulations of NU
AD	Administrative Drop – An administrative drop occurs when a student has failed to attend the first week of any class for which they have completed registration and appear on the class roster. This process is initiated by the appropriate School to which the course belongs

24. GRADUATION REQUIREMENTS FOR BEng(HONS) IN CIVIL AND ENVIRONMENTAL ENGINEERING

All students qualifying for a 4-year Full-time Undergraduate Degree offered from fall 2018 onward must meet the following specific graduation requirements of their chosen program of study:

(i) Complete successfully a minimum of 248 ECTS composed of courses as specified in the program curriculum;

(ii) Obtain at least a C- grade for the Capstone Project;

(iii) Earn a CGPA of 2.00 or above at graduation.

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24.1 It is the student's responsibility to ensure that all requirements for graduation are fulfilled in a timely fashion. The student should consult his/her academic advisor to determine whether the requirements have been met and, if not, what the student must do to meet the requirement.

24.2 The Office of the Registrar will send the list of students who meet graduation requirements, including their CGPA's and completed courses, to the Dean, who will approve each individual student and then t=return the list to the Office of the Registrar.

24.3 The Registrar will review all information, based on the recommendation of the Dean, and verify the list of students for graduation.

24.4 The list of recommended and verified students will be submitted to the Provost for final approval.

25. AWARD CLASSIFICATION

25.1 An undergraduate student is eligible for honors designation and will receive "red" diplomas, if he/she meets one of the following criteria:

1) his/he completed academic record equal to 4.00 CGPA. Such student qualifies for the category "Distinction";
2) his/he completed academic record equal to 3.90 CGPA and above (CGPA at graduation >= 3.90) .calculated after excluding student(s) eligible for the category "Distinction". Such student qualifies for the category "Summa Cum Laude";
3) his/he completed academic record equal to 3.80 CGPA and above (CGPA at graduation >= 3.80) .calculated after excluding student(s) eligible for the category "Distinction" and "Summa Cum Laude". Such student qualifies for the category "Magna Cum Laude";

25.2 Any courses passed after the graduation requirement has been met will not be taken into account in the grade point calculation for award classification.

26. END-OF-SEMESTER AND FINAL EXAMINATIONS

End-of-Semester Period

26.1 The End-of-Semester period is a time of reduced social and extracurricular activity, starting with the last week of classes and continuing through the final examination period. In this period, students concentrate on academic work and prepare for the final examinations.

26.2 The following rules govern the conduct of classes during the End-of-Semester period:

1) During this time course instructors should neither make extraordinary assignments nor announce additional course meetings to "catch-up" in course presentations that have fallen behind. Course instructors may choose to conduct optional review sessions and to suggest other activities that might seem appropriate for students preparing for final examinations. Review sessions should be scheduled for optimal attendance, and a serious effort should be made by course instructors to accommodate students who are unable to attend a scheduled review session.
2) No graded homework assignments, mandatory quizzes, or examinations should be given during the last week of classes except:
   a) in classes, where graded homework assignments or quizzes are routine parts of the instruction process, or
   b) in classes with laboratories, where the final examination will not test the laboratory component. In such a case, the laboratory sessions during the week preceding examination period may be used o examine students on that aspect of the course
   c) Take-home examinations, given in place of the officially scheduled in-class examination, may be distributed in the week preceding the final examination period
   d) During the End-of-Semester period, no course instructor may schedule any extracurricular musical, dramatic, or athletic events involving compulsory student participation, nor may students be asked to attend any meetings of committees

Final Examinations

26.3 No other coursework, including laboratory or studio work, will be due during the final examination period unless it is assigned in advance and in lieu of the course's final examination.

26.4 All scheduled final examinations, or equivalent final graded exercises, are held at the end of the semester during NU's official final examination period. Final papers or other assignments that are assigned in lieu of a final examination will be due during the NU's final examination period.

26.5 The final exam schedule is generated by the Office of the Registrar. The date, time and venue of the final exam should not be changed. No student shall be required to take more than two scheduled final examinations that take place within a single calendar day. Students who find conflicts in their final examinations should seek to resolve these with the course instructors involved at the time the final examination schedule is posted. Course instructors are encouraged to be accommodating whenever possible. If a course instructor refuses to accommodate a conflict in a situation where a student is scheduled for more than two final examinations on the same calendar day, the student may

appeal to the Dean.

26.6 On the day of the final exam, a student who is sick or has extenuating conditions that can affect the performance may apply for deferred assessment and should not sit for the exam. Once he/she sits for the exam, the student cannot appeal the grade based on medical and extenuating condition grounds (refer to Sections 20 and 22).

26.7 Students with a disability, dyslexia or other diseases can apply for special assessment arrangements in their final exams. Notification of special requirements must be made by the student to the course instructor at least three working days prior to the final exam. If the student did not apply for special assessment arrangements and sit for the exam, they cannot appeal the grade based on medical or extenuating condition grounds (refer to Sections 20 and 22).

26.8 Any student shall be permitted to review his or her corrected, graded final examination in the presence of a faculty or staff member within the stipulated period set by the course coordinator. If any error is found, the student should appeal (refer to Section 20).

Student Examination Conduct

26.9 Students are expected to arrive at the examination room on time.

26.10 Student will be required to present a current NU student identity card when entering an examination hall, and to display this card on their desks during the examination.

26.11 All rules concerning the administration of the examination will be explained to the students before the start of the examination. Students are required to observe all instructions given by examiners, supervisors, proctors, or other officials responsible for the conduct of the examinations.

26.12 The following rules apply to all examinations:

1) Talking to anyone other than the proctor in the examination room is not permitted.
2) The presence of any illegal items (unless permitted by the examination) will be grounds for charges of academic misconduct and immediate expulsion from the examination, and a grade of “F” on that examination. These items include but are not limited to cell phones or any text messaging devices.
3) Students must stop working at the end of the time allowed for the examination. Continuing to work on the examination after the allowed time is considered cheating.

26.13 Communicating answers to other students is as serious as receiving answers. Students who assist others are subjects to disciplinary actions and penalties.

27. ACADEMIC MISCONDUCT

27.1 All academic misconduct will be processed in accordance to the NU Student Code of Conduct and Disciplinary Procedures.

27.2 All disciplinary actions against students' misconducts will be recorded in students' records.

27.3 Students who have committed disciplinary offences (covering both academic and non-academic related matters) will be put on 'disciplinary probation'. The student will lose the stipend during the 'disciplinary probation'.

27.4 Students with two academic misconducts will be recommended for dismissal.

27.5 Students with records of academic misconduct will not be considered for University funded activities including student trips and overseas summer mobility programs.

27.6 The University reserves the right to withhold the issuance of any certificate of study to a student who has unsettled matters with the University, or who is subject to disciplinary action.

28. COURSE SPECIFICATIONS

28.1 Nazarbayev University Undergraduate Core Curriculum

Course Code and Title	**SHSS 150: Rhetoric and Composition**
Course Descriptor	This course familiarizes students with the skills and process involved in writing an academic research paper. With a focus on the steps of the writing process, students will complete two major research papers, while practicing skills in summarizing, paraphrasing, and citation. In addition to the mechanics of writing, the course emphasizes the development of critical thinking skills through reading, response, and discussion. Another goal of the course is to increase students' oral communication skills through both class discussion and presentations. Finally, SHSS 150 focuses on helping students develop an original and distinctive writing voice, one that allows synthesis of personal experience, opinion, and reading.
Course LOs	By the end of the course the student will be expected to be able to: 1) Accurately paraphrase short passages while writing a concise summary of an article or book chapter; 2) Critically and thoughtfully engage with academic texts through class discussions, writing summaries and responses, and through oral presentations; 3) Write a logical, well-organized, and coherent research essay of 5-7 pages with correct citations (minimum of five sources) and appropriate vocabulary.

Course Code and Title	**SHSS 210 Technical Writing**
Course Descriptor	This course presents students with practical information about communicating in different kinds of workplace environments and professional and technical discourse communities. This course highlights the key characteristics of technical writing and emphasizes the importance of planning, drafting, and revising texts. Students will analyze and produce common technical writing genres, and react to rhetorical situations each genre presents, including issues of audience, organization, visual design, style, and the production of texts.
Course LOs	By the end of the course the student will be expected to be able to: 1) Recognize the use of rhetorical and stylistic elements necessary for the successful practice of scientific and technical communication; 2) Write documents that are accessible to non-specialist audiences; 3) Work individually and collaboratively to research, analyze, and write about public debates surrounding science and technology; 4) Practice the ethical use of sources and appropriate citation conventions; 5) Refine writing style for clarity, concision, coherence, and emphasis; 6) Work with peers to provide written and oral feedback on student work.

Course Code and Title	**KAZ 121 Kazakh I (Upper-intermediate Kazakh)**
Course Descriptor	In this course, students will develop or continue to develop advanced linguistic competencies in four areas: listening, reading, writing and speaking. They will work with materials for level B2 and learn to give opinions on different topics, analyze the text, compare statistical data and write an essay. Hence, they will learn vocabulary and grammar appropriately each theme. Furthermore they will additionally learn new terms demonstrating Kazakh culture in this course.
Course LOs	By the end of the course the student will be able to: 1) Discuss issues on topics included in the syllabus, give detailed answers, and provide an opinion on the topics; 2) Formulate main idea and report on the texts for upper-intermediate level; 3) Synthesize info and arguments from a number of sources; 4) Critically analyze and evaluate papers for general public with consideration of principles of unity, coherence, tone, persona, purpose, methods; 5) Follow the discussion on matters related to their field and understand in detail the points given prominence by the speaker; 6) Make a descriptive and comparative report/diagram/chart; 7) Argue with good grammatical control without much sign of having to restrict what they want to say; 8) Make well-structured project presentation with introduction, main body, conclusion and reference; 9) Make own judgement in planning, problem solving and make a decision in different social and cultural situations.

Code and Title	**KAZ 264 Kazakh I (Language and ethnicity)**
Course Descriptor	Developed for the «C1» level, this course is intended for studying an ethnos through language units preserved in its vocabulary. During this course, the students will study and analyze ethnocultural lexis (words, word combinations, fixed phrases, proverbs, historical texts). By means of these analysis, they will learn about perceptions, psychology, character, and preferences of the Kazakh people. The students are going to identify and analyze extralinguistic factors that have influenced the formation of national cultural lexis. As a result, they will have learned that the national lexis can provide information about the nation and also the ways to analyze it. Besides, the knowledge of identifying national cultural peculiarities that the students are going to gain in this course can be used in their study of other languages. As course materials, the students are going to read oral literature and ethnographic texts and work with ethnoliguistic, etymology and dialect dictionaries.
Course LOs	By the end of the course the student will be expected to be able to: 1) To develop and use the norms of intellectual language competences through understanding the connection between the language and national mentality and culture; 2) To use the national perceptions and knowledge for personal development, preparation of qualitative proposals and effective decision-making; 3) To be skilled to use interlanguage communication principles as a tool of development business responsibility;

	4) To learn using the national values as a source of information and creative source of development the business responsibility; 5) To develop skills in analyzing deeper national cultural layers of the Kazakh language, using it in different social and cultural situations.

Course Code and Title	**HST 100 History of Kazakhstan**
Course Descriptor	This course is a history of the territories which today make up Kazakhstan, from the Mongol conquests to the collapse of the USSR. The course combines a thematic approach with a chronological structure. We will examine two interrelated aspects of the history of the lands that today make up Kazakhstan. Firstly, we will analyse how authority was asserted, recognized, and challenged over the past few centuries. How did modern states emerge? What were the limits of state control over society and culture? What role did religious and national identities play in bringing political communities together and in tearing them apart? Who paid the costs of political and economic modernization? Secondly, we will study the usage of land and other natural resources. How did people assert the right to use land? What tensions did land usage and the exploitation of natural resources cause? What were the economic and environmental effects of land usage?
Course LOs	By the end of the course the student will be expected to be able to: 1) Acquire an understanding of the relationship between political authority, natural resources, and social and cultural change in territories of modern-day Kazakhstan from a historical perspective; 2) Learn to search for information, to weigh evidence, and to draw conclusions about key social, cultural, and political issues in history; 3) Learn to work with primary sources; 4) Learn to understand historical scholarly texts; 5) Learn to express their own arguments in a clear and convincing manner.

Course Code and Title	**PHIL 210 Ethics**
Course Descriptor	This course will focus on the philosophical study of ethics. It will peruse questions such as 'How do we acquire moral knowledge?', 'What kind of life is a good life?', 'Is ethics relative or universal?' and 'Is ethics an expression of human sentiment or is it a kind of knowledge?' 'Why should I be moral?', 'Can morality survive without religion?', 'What is wrong with slavery?'. The courses aims are, first, to help you to understand philosophical arguments, and, second, to encourage you to reflect on ethical questions..
Course LOs	By the end of the course the student will be expected to be able to: 1) Hone skills at reason giving and providing arguments; 2) Engaging with novel ideas, exploring intellectual problems in depth, and writing clearly; 3) The development of intellectual virtues, such as open-mindedness, intellectual courage, fairmindedness, intellectual charity, and inquisitiveness.

Course Code and Title	**PHIL 211 Practical Ethics**
Course Descriptor	Practical Ethics will draw on research in moral psychology, applied ethics, and virtue theory which have brought to light that environments sometimes have a profound impact on people's moral behaviour. The course will help students understand the factors that influence moral and immoral behaviour in both others and themselves and help them understand how environments, social structures and cultures can be designed in order to promote moral behaviour. It will also consider issues like whether such "moral engineering" is morally justifiable.
Course LOs	By the end of the course the student will be expected to be able to: 1) Apply theoretical models to real world scenarios in the pursuit of promoting moral behaviour 2) Identify environmental factors that can lead to moral failures and successes in individuals, groups, and organisations 3) Propose changes that could be made in order to promote better moral behaviour

Course Code and Title	**PHIL 212 Ethical Reasoning**
Course Descriptor	To become a truly good person one must learn to think and reason ethically whenever faced with a diversity of problematic situations and practical matters in private and public life. This course on ethical reasoning integrates ethical questions from other courses into an intellectual pattern that guides students through the maze of circumstances in which skills to reason well and morally right often prove critical. Learning the essentials of rational argument, critical thinking and nature of social decisions gives students vital advantages to evaluate problematic situations, formulate arguments and to create novel problem-solving methods that can resolve moral dilemmas and alleviate value-laden tensions.
Course LOs	By the end of the course the student will be expected to be able to: 1) Evaluate the nature of ethically problematic situations 2) Identify sustainable strategies to avoid hazardous social and cognitive biases and other factors that degrade our thoughts, cultures and societies 3) Create novel problem-solving methods that can resolve moral dilemmas and alleviate value-laden tensions

Course Code and Title	**XXX Fundamentals of Entrepreneurship and Management**
Course Descriptor	This course introduces students to the fundamentals of entrepreneurship. It covers topics including opportunity identification, idea generation, building business models and plans, to presenting ideas. We will discuss the role of entrepreneurial activity in Kazakhstan's economy. The course is a guide to high-growth entrepreneurship, combining theoretical frameworks with cases and practice-oriented exercises.
Course LOs	By the end of the course the student will be expected to be able to: 1) Comprehend basic concepts of the entrepreneurial process; 2) Comprehend basic tools for the analysis of the entrepreneurial process; 3) Apply those concepts as part of a working team in the development, reporting and presentation of a business plan.

Course Code and Title	**ECON 323 Managerial Economics**
Course Descriptor	The goal of this course is to learn how to apply microeconomic principles and quantitative tools to managerial decisions. It covers issues like demand analysis, production and cost analysis, and pricing strategy. By doing so, this course helps students develop strategies and tools for solving a wide variety of issues and problems that managers face. Students who successfully complete this course are expected to make an accurate evaluation of external business environment and create value within various organizational settings.
Course LOs	By the end of the course the student will be expected to be able to: 1) Make an accurate evaluation of external business environment; 2) Create value within various organizational settings.

Course Code and Title	**MATH 161 Calculus I**
Course Descriptor	This course covers limits and continuity as well as differentiation and integration of polynomial, rational, trigonometric, logarithmic, exponential and algebraic function. The application areas include slope, velocity, extrema, area, and volume.
Course LOs	By the end of the course the student will be expected to be able to: 1) Use both the limit definition and rules of differentiation to differentiate functions; 2) Sketch the graph of a function using asymptotes, critical points, the derivative test for increasing/decreasing functions, and concavity; 3) Apply differentiation to solve applied max/min problems; 4) Apply differentiation to solve related rates problems; 5) Evaluate integrals both by using Riemann sums and by using the Fundamental Theorem of Calculus; 6) Apply integration to compute arc lengths, and areas between two curves; 7) Use L'Hospital's rule to evaluate certain indefinite forms.

Course Code and Title	**MATH 162 Calculus II**
Course Descriptor	This course covers transcendental functions, advanced integration techniques, improper integrals, area and arc length in polar coordinates, infinite series, power series and Taylor's theorem.
Course LOs	By the end of the course the student will be expected to be able to: 1) Integrate functions whose antiderivative is given by elementary functions; 2) Use integrals in a variety of area and volume computations; 3) Solve first order differential equations by separation of variables or the method of integrating factors; 4) Analyze the convergence of series which are either absolutely convergent or alternating; 5) Know the most usual Maclaurin series expansions and their intervals of convergence, together with how to derive them; 6) Work with curves in parametric form, especially polar coordinates; 7) Identify types of conic from their equation in cartesian or polar coordinates.

Course Code and Title	**ENG 100 Introduction to Engineering**
Course Descriptor	This course introduces students to the foundation and fundamental principles required to become analytical, detail-oriented, and productive engineers. The students will also gain an overview of what engineers do and of the various areas of specialization. Important topics for the engineering profession such as research in engineering, communications, and safety are also introduced. Additionally, students will work together in interdisciplinary groups to research, design, fabricate, test, and deploy a complete engineering project. Through lectures, laboratory practicum and project work, the students will become familiar with the following topics: Overview of the Engineering Discipline; Engineering Communications; Research Skills; Occupational Health & Safety; Drafting and 3D Modelling; Fundamental Dimensions and Units; Manufacturing (3D Printing and/or others); Material & Chemical Properties; Hydraulics and Fluids management; Programming; AC/DC circuits
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain many of the different specializations of the engineering profession. Be in a position to apply basic research skills in engineering. 2) Program electronic components (e.g., microcontrollers such as Arduino Uno, Raspberry Pi) for sensor components, controllers, and actuators for an engineering system 3) Design & Visualize engineering components & systems using 3D CAD modelling software 4) Describe & Apply manufacturing processes for engineering components (e.g. via 3D printing) 5) Explain & Use hydraulics and fluid mechanics properties for fluid processes. Design, Assemble and Test engineering systems 6) Explain various safety issues typical for an engineering environment & Apply safety precautions as required. 7) Apply hands-on approaches to troubleshooting electrical/mechanical/civil/chemical engineering systems. Devise effective teamwork practices for problem solving.

Course Code and Title	**ENG 101 Programming for Engineers**
Course Descriptor	This is an introductory course for programming essential for Engineering undergraduate study. The module would focus on the development of programming skills that can be directly applied to solve engineering problems where the computer is part of the system or is used to model a physical or logical system. This module introduces programming as a tool for solving engineering problems through C and Java programming languages. This is an introductory course providing foundational programming to Chemical, Mechanical, Civil and Electrical Engineers. Topics covered include: Introduction to computers and programming, Variables in C, assignment statements, and arithmetic expressions, Input/output operations and functions, Operators: rules of operator precedence, Flow of Control, if-else, switch, while, for, do, Structured programming, Arrays & Pointers, Dynamic Memory Allocation, Elementary programming in Java, Methods in Java, Methods and Arrays in Java, Objects and Classes.
Course LOs	At the end of the course the learner will be expected to be able to: 1) Develop programming solutions to open ended engineering problems. 2) Infer alternate solutions to programming problems. 3) Develop software specifically using C and Java programming languages. 4) Apply knowledge of programming to solve practically relevant engineering problems. 5) Use the object oriented concepts to write optimal and efficient codes.

Course Code and Title	**ENG 102 Engineering Materials I**
Course Descriptor	The module covers the fundamentals of materials science and engineering. These include the understanding of the material structure from the atomic to micro to macro levels. The effects of the structure and the processing techniques on the material properties will be discussed. These concepts will be illustrated using metals to allow students to utilize the knowledge for materials selection in common engineering applications.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain the influences of microscopic structure and defects on material properties, including dislocation and strengthening mechanisms 2) Understand the applications and processing of common engineering materials including metals & their alloys 3) Conduct appropriate tests to determine given mechanical properties using both destructive and non-destructive techniques. 4) Assess and describe the mechanisms leading to failure when provided with a failure example with an unknown cause.

Course Code and Title	**PHY 161 Physics I for Scientists and Engineers**
Course Descriptor	This is an introductory calculus-based course covering Mechanics, Mechanical Waves and Thermodynamics. The students will learn to identify fundamental laws of mechanics and thermodynamics in everyday phenomena and to apply these laws to solving basic physics problems and to describing laboratory experiments.
Course LOs	At the end of the course the learner will be expected to be able to: 1) Think critically and scientifically by applying physics concepts, including from other classes. 2) The student will gain knowledge and develop the skills to understand, set-up and solve qualitatively physics problems for the basic topics. 3) The student will learn the appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in topics listed above. 4) The student will improve his/her communicating skills related to this course via the reading the textbook and additional materials, doing homework problems, writing laboratory reports and doing optional in-class presentation. 5) The student will collect and analyze data and/or information from external sources. 6) The student will prepare coherent reports based on the accepted standards presented in class. 7) The student will meet the deadlines developing effective learning habits and discipline necessary to promote life-long learning.

Course Code and Title	**PHYS 162 Physics II for Scientists and Engineers**
Course Descriptor	This is an introductory calculus-based course covering Electricity, Magnetism and elements of Optics. The students will learn to identify fundamental laws in everyday electromagnetic phenomena and to apply these laws to solving basic physics problems and to describing laboratory experiments.
Course LOs	At the end of the course the learner will be expected to be able to: 1) Think critically and scientifically by applying physics concepts, including from other classes. 2) The student will gain knowledge and develop the skills to understand, set-up and solve qualitatively physics problems for the basic topics. 3) The student will learn the appropriate mathematical techniques and concepts to obtain quantitative solutions to problems in topics listed above. 4) The student will improve his/her communicating skills related to this course via the reading the textbook and additional materials, doing homework problems, writing laboratory reports and doing optional in-class presentation. 5) The student will collect and analyze data and/or information from external sources. 6) The student will prepare coherent reports based on the accepted standards presented in class. 7) The student will meet the deadlines developing effective learning habits and discipline necessary to promote life-long learning.

Course Code and Title	**ENG 200 Differential Equations and Linear Algebra**
Course Descriptor	This course is about the mathematics that is most widely used in the engineering core courses: An introduction to ordinary differential equations and linear algebra. Topics covered include a) Differential equations of first- and second-order b) Series solution of differential equations c) Laplace transforms and its application to the solution of initial value problems d) Some of the important special functions. e) Linear algebra applications
Course LOs	By the end of the course the student will be expected to be able to: 1) Solve a large class of first- and second-order differential equations analytically using standard techniques. 2) Model simple physical situations encountered in engineering using first- and second-order differential equations. 3) Use Laplace transform techniques to solve first- and second-order initial value problems. 4) Recognise and work with a number of the higher transcendental functions of mathematics. 5) Solve more difficult second-order linear differential equations using series solutions. 6). Find general solutions to linear algebraic equation systems. 7) Use Mathematica for both calculus and linear algebraic applications.

Course Code and Title	**ENG 201 Applied Statistics**
Course Descriptor	This course provides an introduction to basic probability theory and statistics. Topics include sample spaces, events, classical and axiomatic definition of probability, conditional probability, independence, expectation and conditional expectation, variance, distributions of discrete and continuous random variables, joint distributions, central limit theorem, descriptive statistics, confidence interval estimation, and hypothesis testing.
Course LOs	By the end of the course the student will be expected to be able to: 1) Describe various interpretations of probability and the difference between discrete random variables 2) List important continuous and discrete distributions. 3) Compute descriptive statistics and summarize a dataset 4) Compute confidence intervals and conduct hypothesis tests 5) Use software for basic statistical analysis.

Course Code and Title	**ENG 202 Numerical Methods**
Course Descriptor	This course will introduce students to various numerical techniques currently used by practicing engineers and to give them a sound underpinning knowledge of the workings of these techniques. How computer programs aid in the use of numerical methods will also be demonstrated.
Course LOs	By the end of the course the student will be expected to be able to: 1) Demonstrate knowledge and understanding of numerical methods to solve systems of linear equations; 2) Demonstrate knowledge and understanding of numerical methods to interpolate and to compute quadratures; 3) Demonstrate knowledge and understanding of numerical methods to solve ordinary differential equations; 4) Demonstrate knowledge and understanding of numerical methods to solve simple partial differential equations; 5) Analyze a mathematical problem and determine which numerical technique to use to solve it; 6) Show logic in coding a mathematical problem in algorithmic form; and, 7) Incorporate MATLAB and *Mathematica* into numerical solutions.

Course Code and Title	**ENG 300 Interdisciplinary Design Project**
Course Descriptor	In this course students work in interdisciplinary teams toward a holistic approach to design projects; including problem definition, design proposal, implementation and critical evaluation. The course explores design research and practice within social and economic contexts; including the ethical, cultural, and environmental impacts of design decisions, intellectual property considerations, and aspects of appropriate professional conduct. The course will focus on tools and skill sets that are particularly important for succeeding in a design project, including planning, teamwork, project management, and design reporting. Where possible, it is expected that the projects will include an industrial partner, who will provide realistic industrial problems and support them with necessary guidance and resources. This course requires students form and work in groups of 5 or more in size.
Course LOs	By the end of the course the student will be expected to be able to: 1) Apply the knowledge acquired in earlier courses in the study of a complex design problem; Analyze a mathematical problem and determine which numerical technique to use to solve it; 2) Identify the requirements, which have to be fulfilled by possible solutions (‘designs’) to solve the earlier identified design problem; Incorporate MATLAB and *Mathematica* into numerical solutions. 3) Develop solutions for a complex design problem. These solutions should be well argued, if the data allow, also quantified and applicable in practice (by the final customer, if available); 4) Present and defend team results 5) Collaborate and cooperate in such a way that the project goals are fulfilled; 6) Effectively manage a project.

Course Code and Title	**ENG 400 Capstone Project**
Course Descriptor	The capstone project is the culminating experience of the student's engineering program and provides students with the opportunity to apply and integrate their knowledge and skills gained from earlier years. This is achieved in a context of a year-long and substantial engineering project related to the student's discipline area. Students will take the responsibility to organise, plan and carry-out the various tasks required for successful completion of the project. Wherever possible, projects will be sourced from industry partners. Projects may be undertaken by individual students or in small teams. At the completion of the unit, students will hand over their project deliverables and present project outcomes in a report as well as end-of-semester oral presentation and defense.
Course LOs	By the end of the course the student will be expected to be able to: 1) Evaluate and perform survey to propose an open design or research problem; 2) Extensively criticize and apply Engineering research methods to evaluate feasibility of a diverse set of solutions. 3) Design, interpret, and invent to meet design specifications of a real-life engineering problem; Present and defend team results 4) Produce and develop a well written capstone project report and project presentation 5) Prove ability to communicate effectively with all stakeholders in an ethical and professional manner and confidently defend ideas and proposals to the project client and university audiences.

28.2 Civil and Environmental Engineering Undergraduate Core Curriculum

Course Code and Title	**CEE 200/MAE 200 Structural Mechanics I**
Course Descriptor	The subject of structural mechanics aims to study forces acting on rigid bodies at rest. Time will be spent finding free body diagrams. Finding resultant forces for a variety of force systems and structure. As well as finding the reacting forces at the boundary conditions, due to forces acting on bodies. From the analysis of forces the stresses present within the structure will analyzed. Students shall develop critical thinking skills to be able to find to develop an analysis that leads a suitable solution(s) to structural (statics) real life problems using force and stress analysis.
Course LOs	By the end of the course the student will be expected to be able to: 1) Identify the forces applied to a structure and sketch the Free Body Diagram 2) Calculate the forces at the support (reaction forces) 3) Calculate the forces and stress acting on bars (trusses) and beams. 4) Calculate the deformation (deflection, elongation etc) of structural elements

Course Code and Title	**CEE 201 Environmental Chemistry**
Course Descriptor	The module is essential for an undergraduate Civil Engineering program, since it is a prerequisite for further courses related to environmental engineering area, i.e. environmental engineering, water and wastewater treatment processes, electives. This course will give the students fundamental knowledge on environmental chemistry. It will include chemistry principles, cycles of chemicals in environment, reactions, kinetics, equilibria, electrochemistry, chemistry of environmental processes.
Course LOs	By the end of the course the student will be expected to be able to: 1) Apply knowledge on chemistry theories, laws and definitions 2) Interpret scientific vocabulary and terminology 3) Be aware of the existing scientific techniques related to the discipline 4) Explain environmental processes

Course Code and Title	**CEE 202 Environmental Engineering**
Course Descriptor	Environmental engineering fundamentals are essential for an undergraduate Civil Engineering program. Environmental engineering is a relatively new field of study in civil engineering. Pollution issues became evident in the 20th century as surface waters became polluted with untreated industrial and municipal wastes. Disease outbreaks were common. These issues have been largely addressed in western society, but in developing countries, access to clean water and adequate sanitation remain as significant public health issues. This course will give the students fundamental science and principles of environmental

	engineering. It will include water, soil, air pollution and control.
Course LOs	By the end of the course the student will be expected to be able to: 1) Apply fundamentals and principles of environmental engineering. 2) Integrate concepts of environmental sciences and engineering to propose/develop technologies/processes to meet defined needs. 3) Handle and evaluate different types of information sources. 4) Explain and interpret results of analysis. 5) Justify the value of teamwork to accomplish complex tasks.

Course Code and Title	**CEE 203 Structural Analysis**
Course Descriptor	The module provides the students with fundamental analysis methods which they can apply to analyze a range of statically determinate and indeterminate structures. More specifically students will be able to analyze the truss, beam, column and frame.
Course LOs	By the end of the course the student will be expected to be able to: 1) Apply the principle of equilibrium and geometry compatibility on different structures 2) Evaluate the internal actions and deflections in statically determinate and indeterminate structures 3) Use computer software to analyze statically determinate and indeterminate structures
Course Code and Title	**CEE 204 Civil Engineering CAD and Surveying**
Course Descriptor	This module will introduce the basic concepts of civil engineering drawings with an emphasis on technical solutions. Specifically, students will learn the CAD tools, and general design process for infrastructure projects, such as tall buildings, highways, bridges, dams, tunnels, and land development. This course will also give the students' knowledge of surveying, including determination of positions on the earth's surface. Students will gain the ability to understand and apply methods and use instruments to make measurements and collect data for determining horizontal distances; differences in elevation; angular differences and calculating areas and volumes.
Course LOs	By the end of the course the student will be expected to be able to: 1) Apply the basic design process to civil engineering infrastructures (tall buildings, highways, bridges, dams, tunnels, etc.). 2) Use computer software to prepare civil engineering drawing. 3) Explain the fundamental knowledge about distance measurement, levelling, angle measurement, surveying errors and adjustments. 4) Complete logical field notes from surveying operations, whether recorded manually or with automatic data collection methods.

Course Code and Title	**CEE 300 Structural Design - Concrete**
Course Descriptor	The objective of this module is to prepare students for entry level structural engineering employment by providing them with abilities to design reinforced concrete structures. It is a direct application of preceding modules: Structural Analysis. This module will provide the basic

	design techniques for students to be ready for the succeeding module: Capstone Design. This module provides students with abilities to design reinforced concrete structural members such as beams, columns, slabs and foundations. Design procedures are based on the European Code 2 for Concrete. The mechanics underlying the code design procedures are evaluated as well as their application to practical design problems.
Course LOs	By the end of the course the student will be expected to be able to: 1) Identify the common construction material used in concrete structures. 2) Critically evaluate mechanics underlying the design code. 3) Perform structural design by using mathematics, mechanics and structural analysis tools. 4) Design structural elements following design codes and engineering practices independently. 5) Solve practical design problems with uncertainties.

Course Code and Title	**CEE 301 Structural Design - Steel**
Course Descriptor	The objective of this module is to prepare students for entry level structural engineering employment by providing them with abilities to design steel structures. It is a direct application of preceding module: Structural Analysis. This module will provide the basic design techniques for students to be ready for the module: Capstone Design. This module provides students with abilities to design steel structural members such as beams, columns, slabs and foundations. Design procedures are based on the European Code 3 for Steel. The mechanics underlying the code design procedures are evaluated as well as their application to practical design problems.
Course LOs	By the end of the course the student will be expected to be able to: 1) Identify the common construction material used in steel structures. 2) Critically evaluate mechanics underlying the design code. 3) Perform structural design by using mathematics, mechanics and structural analysis tools. 4) Design structural elements following design codes and engineering practices independently. 5) Solve practical design problems with uncertainties.

Course Code and Title	**CEE 302 Geotechnical Engineering**
Course Descriptor	The content of the module includes physical description and classification of soils and explanation of the material behaviour in common loading conditions: one dimensional compression and shear loading mode. The influence of underground water condition on soil behaviour is presented using the concept of effective stress and seepage flow theory.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain classification system of soil and know how to conduct soil classification experiment 2) Apply the concept of effective stress and know how to calculate effective stress and pore ware pressure at a depth below a ground

	surface 3) Recall the characteristics of underground seepage flow, draw flownet and measure seepage velocity in the laboratory 4) Explain compression behaviour of soil and know how soil-settlement-related properties can be obtained from conducting an oedometer test 5) Analyze shear behaviour of soil and know how shear strength of soil can be obtained from conducting a direct shear test 6) Present technical data in a written form of a laboratory report and/or in an oral presentation.

Course Code and Title	**CEE 303 Geotechnical Design**
Course Descriptor	This course will focus on geotechnical design of shallow and deep foundations, including spread footings, mats, driven piles, and drilled piers. Coverage includes bearing capacity, settlement, group effects, and lateral load capacity of the various foundation types. Additional topics include retaining structures, slope stability, subsurface exploration, construction of deep foundations, and analysis of geotechnical structure using numerical method (FEM).
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain material behaviour and site characterization. 2) Explain the mechanics for geotechnical structures. 3) Identify, formulate and solve engineering problems critically. 4) Apply mathematics and mechanics on geotechnical design. 5) Design and analyze geotechnical structures. 6) Apply computer software for analyzing geotechnical structures.

Course Code and Title	**CEE 304 / MAE 300 Fluid Mechanics I**
Course Descriptor	Engineering is becoming increasingly international and competitive and customers are expecting products of high quality and reliability. Knowledge of Fluid Mechanics is critical for any engineer involved in the design of mechanical components. After completion of this module students will gain an understanding and expertise in the use of dimensional analysis, integral form of linear and angular momentum equations, calculation of complex fluid flow systems, flows around immersed bodies and free-surface flows
Course LOs	By the end of the course the student will be expected to be able to: 1) Use dimensional analysis to obtain the dimensionless groups and employ them for modeling purposes using similarity. 2) Compute the forces and velocities in a moving fluid using conservation laws in control volume form, for steady flow. 3) Calculate the viscous losses associated with a pipe network hence estimate the necessary pressure/power to drive the flow. 4) Compute the forces exerted by a fluid over an immersed body. 5) Determine the velocity profile of some basic flows, both viscous and inviscid, free surface and pressurized flow.

Course Code and Title	**CEE 305 Hydraulics and Hydrology**
Course Descriptor	Principles of open channel hydraulics are applied to design of lined and unlined channels. Energy and momentum principles are studied with application to channel transitions, critical flow, choked flow, hydraulic jumps, and gradually varied flow. Methods for natural channel design and channel restoration are examined. The hydrologic processes of precipitation and snowmelt, evapotranspiration, ground water movement, and surface and subsurface runoff are examined. Water resources sustainability issues are discussed, including water usage and water shortages, climate change impacts, land use impacts, and source water protection. Conceptual models of runoff and basics of hydrologic modelling are developed, including runoff hydrographs, the unit hydrograph method and the Rational method. Methods for statistical analysis of hydrologic data, concepts of risk and design, and hydrological consequences of climate change for design are introduced.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain the physical and mathematical fundaments of hydraulics and the basics of flow control and flow measurements. 2) Determine the influence of basic hydraulic structures on flow in open channels (energy losses, backwater effects etc. 3) Explain the physical and mathematical fundaments of hydrology and overview of hydrological science and water resource issues. 4) Take hydrological and meteorological measurements. 5) Apply hydrologic principles to water related problems.

Course Code and Title	**CEE 306 Civil Engineering Materials**
Course Descriptor	A successful student will be able to understand the mechanical behaviors of various civil engineering construction materials including aggregate, portland cement and portland cement concrete, asphalt cement and asphalt concrete, masonry, and woods. They will also be able to apply material properties to design and analyze the civil engineering structures.
Course LOs	By the end of the course the student will be expected to be able to: 1) Develop a basic understanding of primary construction material properties, requirements, and related test characteristics 2) Become familiar with selected material application in Civil Engineering construction 3) Become familiar with materials specification development based upon project requirements 4) Gain confidence in testing program planning and execution through participation in the laboratory testing exercises

Course Code and Title	**CEE 400 Transportation Engineering**
Course Descriptor	This course introduces the fundamental principles and methods in planning, design, and operations of transportation systems, driver and vehicle performance capabilities, geometric design principles, traffic analysis and transportation planning. It also allows students to understand the basic principles and methods used by engineers and planners in the planning, design, and operation of transportation systems. Applications of basic principles and methods of transportation engineering, and planning in urban and rural environment are included.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain the fundamental principles of transportation systems. transportation systems components and networks. 2) Describe the operating characteristics of various modes and intermodal combinations. 3) Apply quantitative modeling ideas and various techniques and philosophies of modeling complex transportation enterprises. 4) Utilize computer software to carry out analysis and design.

Course Code and Title	**CEE 401 Construction Technology and Management**
Course Descriptor	This course will introduce students to the civil engineering projects. Various activities encountered during the life cycle of a civil engineering project will be discussed. The basic learning requirements for the civil engineering project manager will be introduced and the qualitative nature of the construction project management will be emphasized. According to the needs of the construction industry, the course will cover overview of construction projects, procurement, contract management, estimation, project planning, construction technology and introduction to information technology in construction.
Course LOs	By the end of the course the student will be expected to be able to: 1) Evaluate and implement technologies that are appropriate for field, laboratory, and office processes related to design and construction 2) Evaluate appropriate means and methods and materials for construction projects 3) Perform standard performance analysis for infrastructure and engineering systems 4) Assess the impact of civil infrastructures systems on health, safety, welfare, sustainability and the environment 5) Explain the history, basic concepts, and processes of construction management. 6) Analyze and manage projects from defining to closure phases.

28.3 Civil and Environmental Engineering Undergraduate Elective Curriculum

Course Code and Title	**CEE 350 Water and Wastewater Treatment Processes**
Course Descriptor	This course will give the student knowledge on softening, coagulation, flocculation, sedimentation, granular filtration, adsorption, membrane separation, ion exchange, biological treatment, chlorination, ozonation, UV radiation.
Course LOs	By the end of the course, the student will be expected to be able to: 1) Explain fundamentals of water/wastewater treatment processes 2) Apply the terminology used in water and wastewater treatment processes, key design parameters and units 3) Design water/wastewater treatment systems 4) Develop and create strong teams of professionals and justify the value of teamwork to accomplish complex tasks.

Course Code and Title	**CEE 351 Application of Geomatics in Civil Engineering**
Course Descriptor	This course will teach students to work with Remote Sensing, Global Navigation Satellite System (GNSS) data, to process satellite data and apply data from the civil engineering projects. Students will be introduced to the Remote Sensing and GIS software tool to work with satellite data. The student will develop their own projects with combined applications of satellite and geodesy datasets. The course will strive to instill an appreciation for the work performed by surveyors, geodesists, and geographers, cartographers and their importance to practice of civil engineering.
Course LOs	By the end of the course the student will be expected to be able to: 1) Process Satellite data, including: downloading the satellite data for the targeted research area, preprocessed the satellite data, atmospheric noise corrections, geo-referencing, raster and shapefiles preparations. 2) Apply Remote Sensing and GIS software tools for the civil engineering projects 3) Evaluate different data layers, including the processed satellite and field collected data with identification errors and uncertainty analysis, calibration and verification of the processed data 4) Prepare professionally engineering drawing, maps, reports, publication article from the processed data

Course Code and Title	**CEE 352 Structure and Properties of Concrete Materials**
Course Descriptor	This module introduces the relationships between the microstructure and the macro properties and characteristics of portland cement concrete (PCC) systems; a thorough understanding of the early-age, mechanical property development, and durability characteristics of Portland cement-based systems. This course enable student to build up the ability to practice sound materials engineering in the field of portland cement material systems.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain PCC material systems. 2) Apply the relationships between the microstructure and the macro properties and characteristics of Portland cement concrete systems 3) Evaluate early-age, mechanical property development, and the durability characteristics of portland cement-based systems 4) Apply sound materials engineering in the field of portland cement material systems

Course Code and Title	**CEE 450 Behavior and Design of Structural System**
Course Descriptor	The objective of this module is to provide students with abilities to conduct structural analysis and design as a whole system. It is a synchronization of previous modules: Structural Analysis I&II, Structural Design Concrete and Structural Design Steel. This module will deepen the knowledge in structural analysis and design delivered in structural engineering core modules and prepares students for graduate level study in the structural engineering. This module covers a wide range of critical topics in structural analysis and design including structural load resisting system; structural stiffness, stability and integrity; nonlinearity and plastic collapse mechanism; introduction to finite element methods and innovative structural systems
Course LOs	By the end of the course the student will be expected to be able to: 1) Design structure as a whole system following design codes and engineering practices 2) Define structural engineering problems 3) Conduct appropriate level of analysis and design for structural systems 4) Evaluate the obtained analysis and design results for structural systems 5) Create innovate and improvement for structural systems.

Course Code and Title	**CEE 451 Prestressed Concrete Design**
Course Descriptor	The objective of this module is to prepare students for entry level structural engineering employment by providing them with abilities to design prestressed concrete structures. It is a direct application of preceding modules: Structural Analysis I&II and an extension of the module: Structural Design Concrete. This module will provide the basic design techniques for students to be ready for the succeeding module: Capstone Design. This module provides students with abilities to design prestressed concrete structural members. Design procedures are based on the ACI318, AASHTO-LRFD & EC2 for structural concrete codes. The mechanics underlying the code design procedures are evaluated as well as their application to practical design problems.
Course LOs	By the end of the course the student will be expected to be able to: 1) Identify the common construction material used in prestress concrete structures 2) Critically evaluate mechanics underlying the design code 3) Effectively use mathematics, mechanics and structural analysis tools for structural design 4) Design structural elements following design codes and engineering practices independently 5) Identify, formulate and solve practical design problems with uncertainties

Course Code and Title	**CEE 452 Advanced Structural Mechanics**
Course Descriptor	The course covers the following topics: index notation, stress and strain tensor, problems in elasticity, failure criteria, torsion, finite element method, application of energy methods, and plastic behavior of materials.
Course LOs	By the end of the course the student will be expected to be able to: 1) Understand basic mechanics 2) Apply different theories of failure 3) Perform elastic analysis of structures 4) Perform plastic analysis of structures 5) Apply numerical method to analyze complex structural problems

Course Code and Title	**CEE 453 Applied Soil Mechanics**
Course Descriptor	This course is designed to provide a theoretical framework for the analysis of deformation and failure of soils with application to several practical problems. These include elasticity for linear deformation, plasticity models (including critical state model) for non-linear deformation and limit equilibrium analyses for important geotechnical problems.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain failure theory for soils and shear strength 2) Perform limit equilibrium analyses for (a) slope instability, (b) lateral earth pressure, and (c) bearing capacity of foundations 3) Explain the elasticity for linear deformation of soils and theory of plasticity for the nonlinear deformation of soils 4) Explain critical state model for the deformation and strength of soils 5) Evaluate the effects of multi-layered soils, submergence, partial-drainage boundaries, time-dependent loading, and radial drainage on consolidation

Course Code and Title	**CEE 454 Foundation Engineering**
Course Descriptor	This course covers site investigation, retaining structures and some types of foundation. The analysis, design and methods of construction will be introduced.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain the process of site investigation and laboratory tests on soils 2) Explain the construction process of various deep foundations 3) Compare and calculate the bearing capacities of foundation by using different theories 4) Compare and calculate the settlements of foundation by using different theories 5) Carry out design of single piles 6) Carry out design of pile groups

Course Code and Title	**CEE 455 Solid and Hazardous Waste Management**
Course Descriptor	This course covers the principles of integrated solid waste management. It provides an overview of municipal solid waste, industrial waste, and hazardous waste management, including design and economic analysis. It also covers the planning and engineering principles needed to address the growing and increasingly intricate problem of controlling and processing the refuse (solid waste) created by urban societies. Some discussion will focus on options such as landfilling, composting, and incineration from engineering; social, and regulatory perspectives. The course reviews in detail physical, chemical, and biological treatment of hazardous waste.
Course LOs	By the end of the course the student will be expected to be able to: 1) Identify key sources, typical quantities generated, composition, and properties of solid and hazardous waste 2) Identify waste transformation and disposal techniques 3) Apply site investigation and processes for construction landfills 4) Integrate concepts of environmental sciences and engineering to propose/develop technologies/processes to meet defined needs 5) Justify the value of teamwork to accomplish complex tasks.

Course Code and Title	**CEE 456 Membrane Separation Processes**
Course Descriptor	Over the past decades, with significant increase in the demand for fresh and clean water due to tremendous growth in human population and various activities, desalination and wastewater treatment techniques have become an increasingly important alternative source of clean water. Among commonly used processes, membrane separation is the most efficient technology. Currently membranes are used for water treatment, power generation, beverages'/pharmaceuticals' concentration, in bioreactors and medical applications, etc. Hence, membrane filtration became a very important laboratory tool and industrial process. This course will give the students deep knowledge on different types of membrane separation processes, i.e. reverse osmosis, nanofiltration, ultrafiltraton, microfiltration, forward osmosis, membrane distillation, etc.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain membrane processes terminology 2) Select a membrane process and design components to carry out a specific separation 3) Evaluate membrane processes on factors such as simplicity, reliability, cost 4) Identify the types of experimental data needed for the calculation of membrane parameters 5) Interpret trends in membrane research

Course Code and Title	**CEE 457 Air Quality Management**
Course Descriptor	This course provides an overview of air quality management. Topics include background of air quality monitoring, types of air pollutants and related health impacts, pollutant sampling and measurement devices, pollutant distributions and dispersal modes as well available methods to control the pollutants. Control management includes both physical and chemical mechanisms, as well as other policy/regulation approaches.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain the basic knowledge including the atmospheric processes and influences of air pollution on health, welfare and economics 2) Identify various types, sources and effect of air pollutants 3) Identify the legislative and regulatory approaches to air quality management 4) Apply management and control of air pollution

Course Code and Title	**CEE 458 Modern Information Technology in Construction**
Course Descriptor	This course will introduce the theory of information systems, advanced spreadsheet modeling, relational database management systems, Building Information Modeling (BIM), and other state-of-the-art ICT tools relevant with construction and civil engineering. Upon course completion, the students will be able to understand the need and challenges of information integration in the AEC industry. It will enable them to develop fundamental understanding towards and basic skills of information modeling using spreadsheets and relational databases. Students will be able to work with the basic and advanced BIM techniques and be able to prepare and use a building's or structure's information model for construction project planning, design, construction and operational phases; and will have a basic knowledge of mobile and/or cloud applications in the construction industry.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain the concept of construction information systems, spreadsheet modeling and relational databases. 2) Evaluate and apply the BIM techniques in a variety of analysis, design and construction problems of building and other types of civil engineering structures 3) Perform the sustainability analysis of buildings in relation to selected dimensions such as energy and water use, etc. using BIM enabled IT tools. 4) Apply computer software for analysis and design.

Course Code and Title	**CEE 459 Water Systems and Structures**
Course Descriptor	This course gives an introduction to the principles of water system analysis, different types of structures for flow control are discussed. It also covers the measurement of flows and design of water structures.
Course LOs	By the end of the course the student will be expected to be able to: 1) Explain the classification and use of water systems and structures. 2) Identify some channel regulating structures and flow measurement structures. 3) Perform analysis and design of water structures.

Course Code and Title	**CEE 460 Water Supply and Distribution Management**
Course Descriptor	This course introduces planning and design for potable water supply and distribution. Topics include the civil engineering design process, pressurized pipe networks, pump selection, water demand estimation, surface- and groundwater resources, and reservoir operation.
Course LOs	By the end of the course the student will be expected to be able to: 1) Design the key elements of a water supply system, including pipe network design, pipe sizing, and treated water storage reservoirs. 2) Estimate water demand based on population, land use, and fire demand. 3) Outline the basic principles of water resources planning and management, with applications to groundwater supplies, surface water supplies, and reservoir operations. 4) Explain the importance of safety culture in the context of professional ethics.

Course Code and Title	**CEE 461 Traffic Engineering and Management**
Course Descriptor	This course introduces the concepts of characterizing traffic, various modeling approaches, and design of facilities to control and manage traffic. The underlying principles, current practices, numerical illustrations, and case studies related to the areas of the subject will be discussed. The course will tackle the fundamental characteristics of traffic first and then move gradually to complex traffic management concepts. Advanced and specialized traffic facilities will also be introduced in the course. The major focus of the course is urban vehicular traffic. However, similar principles and lessons can also be applied on other modes as well. The course will correspond to the current design and analysis practices stipulated in both national and international codes, standards, and manuals.
Course LOs	By the end of the course the student will be expected to be able to: 1) Identify the characteristics of vehicles and road users, components and problems of traffic engineering, and traffic control items. 2) Carry out traffic surveys and analysis. 3) Explain the design principles of intersections. 4) Evaluate the traffic system and management.

Course Code and Title	**CEE 462 Pavement Design and Performance**
Course Descriptor	This course is to provide students with an understanding of the analysis and design of highway pavements, including both flexible and rigid types. The course requires students have background knowledge in both asphalt and Portland cement concrete materials, geotechnical engineering and basic structural design.
Course LOs	By the end of the course the student will be expected to be able to: 1) Estimate pavement design loads (traffic analysis) 2) Identify pavement distress and pavement remedial methods 3) Identify and describe primary factors that affect pavement performance 4) Explain the design and analytical methods of pavements 5) Design flexible and rigid pavements using common procedures and computational tools

Course Code and Title	**CEE 463 Individual Research Project in Civil Engineering I**
Course Descriptor	The course is a student-centered research project and is structured to establish tasks to individual students. Student will learn how to coordinate contribution to research and dissemination, identify specific problems or design issues, carry out structured analysis of the problems and investigation of solutions, communicate ideas and outcomes, conceptual design, design planning & development. This course will allow students to know how to conduct real research or practical engineering investigation under a close supervision of a faculty member in the Civil Engineering Department. Students are required to apply and synthesize civil engineering related knowledge and skills to provide a viable solution to the problems. Students taking this course must continue to take "Individual Research Project in Civil Engineering 2".
Course LOs	By the end of the course the student will be expected to be able to: 1) Discuss the core ideas and key findings gained from a literature review on a specified topic (Background/Introduction) 2) Utilize specific experimental tools or software related to the performed research (Materials and Methods) 3) Clearly present his/her research findings or proposed research within the context of other research studies in the field (Results and Discussion+ Oral Presentation) 4) Propose an idea for a future research study related to the performed research (Conclusion) 5) Demonstrate knowledge and understanding of underpinning science and mathematics, and associated engineering disciplines (Q&A after Oral Presentation)

Course Code and Title	**CEE 464 Individual Research Project in Civil Engineering II**
Course Descriptor	This course is a continuation of "Individual Research Project in Civil Engineering 1" which allows more time to further develop knowledge and skills in the chosen topic. In line with the "Individual Research Project in

	Civil Engineering 1", this course focuses on application, synthesis and development of knowledge and skill in the Program. Building upon previously acquired and developed civil engineering knowledge, this course will allow students to get a further exploration on real research or practical engineering problem in Civil Engineering. Students are required to integrate civil engineering related knowledge and skills to provide a viable solution to the problems. The aim is to provide students an opportunity to handle a practical engineering problem or a research topic. Students are required to present the findings in a professional format.
Course LOs	By the end of the course the student will be expected to be able to: 1) Conduct a more extensive and in-depth literature research and generate research and engineering ideas; 2) Develop a viable solution to solve the identified engineering problems or to further the research findings by employing the latest technology and knowledge (e.g., analytical, numerical, experimental methods) 3) Draw conclusion based on the results and findings 4) Present the solution, findings and recommendations in a professional format