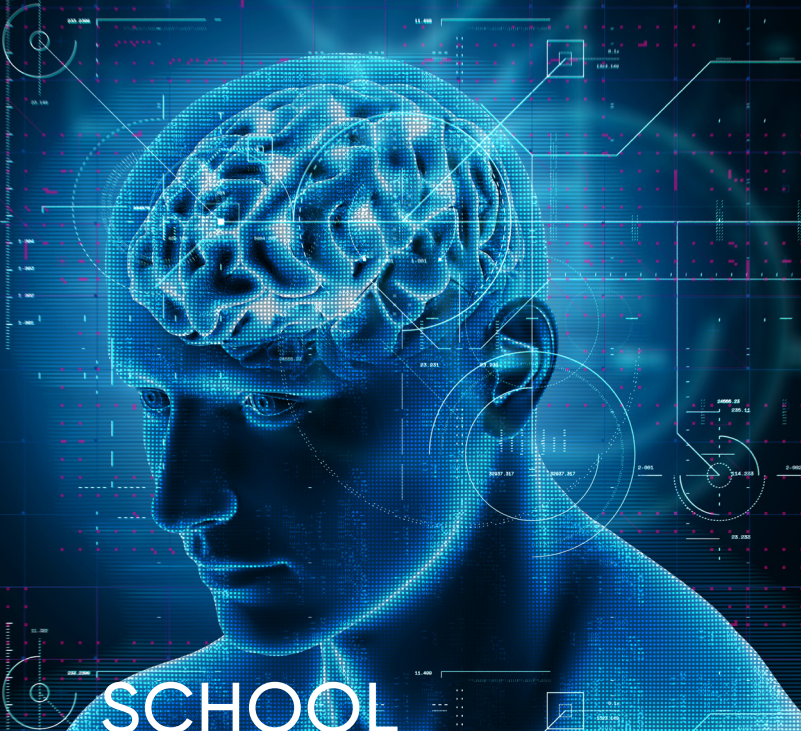


SCHOOL OF ENGINEERING AND DIGITAL SCIENCES

The sky is no longer the limit: creating
and innovating for a better future

NAZARBAYEV UNIVERSITY



SCHOOL OVERVIEW

Nazarbayev University School of Engineering and Digital Sciences integrates best practices in engineering education with cutting-edge research and technology development in an ethical, thoughtful and socially responsible manner. We offer a collaborative environment embracing interdisciplinary thought, creativity, and entrepreneurship serving the nation and the world.

Our graduates are in high demand because of the quality education they have received and the status of Nazarbayev University as a world-class university in STEM education. Many of our graduates will certainly become tomorrow's leaders of the Central Asia and Eurasia's high-tech community.

COMPLETE LIST OF D

UNDERGRADUATE

- BEng in Mechanical and Aerospace Engineering
- BEng in Chemical and Materials Engineering
- BEng in Electrical and Computer Engineering
- BEng in Civil and Environmental Engineering
- BSc in Robotics and Mechatronics
- BSc in Computer Science

OUR STUDENTS



**MADI
ALDABERGEN**

**BEng in Electrical and
Computer Engineering,
class of 2016 alumnus**

Today, I work in Dubai and help the city to become the most innovative city in the world by 2021. I am managing a portfolio of two startup accelerator programs for more than 20 companies in the fields of energy efficiency, Artificial Intelligence (AI), water generation, Internet of Things, etc. I cannot thank NU enough for the education I received and the opportunities it opened up for me.



**AIGERIM
OMIRKHAN**

**BEng in Chemical
and Materials Engineering,
class of 2015 alumna**

NU provided me with stimulating learning environment that is both supportive and motivating. It taught me to dream big and achieve my goals. Now I am continuing my research and pursue PhD at Imperial College, UK.

DEGREES

GRADUATE

- Master of Engineering Management
- MSc in Chemical and Materials Engineering
- MSc in Civil and Environmental Engineering
- MSc in Electrical and Computer Engineering
- MSc in Mechanical and Aerospace Engineering
- MSc in Biomedical Engineering
- MSc in Robotics
- MSc in Computer Science
- MSc in Data Science

PHD

- PhD in Chemical Engineering
- PhD in Civil Engineering
- PhD in Computer Science
- PhD in Electrical Engineering
- PhD in Mechanical Engineering
- PhD in Robotics Engineering

GENERAL INFORMATION

Campus: Nur-Sultan, Kazakhstan

Intake: August

Language of instruction: English

WHY NU?



World-class faculty



Research university



Modern campus with strong infrastructure and facilities



International residency



Access to global digital libraries



Scholarships and discounts

ADMISSION CRITERIA

General requirements

- Application form
- English language proficiency

Degree requirements:

For undergraduate:

SAT reasoning + essay (1240 score) or ACT + writing (27 score)

Depending on major, SAT

Subject Test - Math & Physics or Chemistry & Biology with at least 600 in each subject

For Masters:

min GPA 2.75 (+math test only for Master on Engineering Management)

For PhD: Master Degree or equivalent.

Full details:

seng.nu.edu.kz/admissions



KEY FACTS

Faculty:

114 faculty from

26 countries

Student gender ratio:

70% male

30% female

Graduate placement (2018)

55% employed

36% pursuing further degree (84% of them - abroad)

5% seeking employment

4% other

FEES, FINANCING AND SCHOLARSHIPS

Applicants can be enrolled on the basis of

- State grant
- Ybyray Altynsarin grant
- Abay Kunanbayev grant for foreign students
- Scholarships from **50%** to **90%**
- Fee-paying basis

500+

scholarships are awarded each year in average

CIVIL AND ENVIRONMENTAL ENGINEERING

WHAT IS CIVIL ENGINEERING?

Civil engineering is the design and construction of public works, such as dams, bridges and other large infrastructure projects. It is one of the oldest branches of engineering, dating back to when people first started living in permanent settlements and began shaping their environments to suit their needs. Today, the public is more likely to remember the names of great civil engineering projects than the names of the engineers who designed and built them. These include the Brooklyn Bridge (designed by John August Roebling and son Washington Roebling), the Hoover Dam (John L. Savage), the Panama Canal (John Frank Stevens) and the Golden Gate Bridge (Joseph Strauss and Charles Ellis). One notable exception is the Eiffel Tower, named after Gustave Eiffel, the French civil engineer whose company built it.

ACADEMIC PROGRAMS:

- **Bachelor of Engineering in Civil and Environmental Engineering;**
- **Master of Science in Civil and Environmental Engineering;**
- **PhD in Civil Engineering**

JOB OPPORTUNITIES:

Civil engineers generally work indoors in offices. However, many spend time outdoors at construction sites so they can monitor operations or solve problems onsite. Most civil engineers employed in the private sector work for large construction contractors or as consultants. Government institutions that employ civil engineers include state transportation departments and the military.

- **Architects;**
- **Civil Engineering Technicians;**
- **Construction Managers;**
- **Mechanical Engineers;**
- **Urban and Regional Planners;**
- **Surveyors;**
- **Environmental Engineers;**
- **Landscape Architects.**



BEng CIVIL & ENVIRONMENTAL ENGINEERING

YEAR 1	
Semester 1	Semester 2
Calculus I	Calculus II
Physics I for Scientists and Engineers	Physics II for Scientists and Engineers
Introduction to Engineering	Engineering Materials I
Programming for Engineers	Kazakh I
Rhetoric & Composition	History of Kazakhstan
YEAR 2	
Semester 1	Semester 2
Differential Equations and Linear Algebra	Applied Statistics
Structural Mechanics I	Numerical Methods in Engineering
Civil Engineering CAD and Surveying	Structural Analysis
Environmental Chemistry	Environmental Engineering
Ethics	Technical Writing
YEAR 3	
Semester 1	Semester 2
Structural Design - Concrete	Structural Design - Steel
Geotechnical Engineering	Geotechnical Design
Fluid Mechanics I	Hydraulics and Hydrology
Civil Engineering Materials	Fundamentals of Entrepreneurship & Management
Managerial Economics	Elective 1 or IDP
YEAR 4	
Semester 1	Semester 2
Capstone Project	Capstone Project
Transportation Engineering	Construction Technology & Management
Kazakh II	Elective 4
Elective 2	Elective 5
Elective 3	Elective 6

LIST OF ELECTIVES:

STRUCTURAL ENGINEERING

- Behavior and Design of Structural System
- Prestressed Concrete Design
- Advanced Structural Mechanics

GEOTECHNICAL ENGINEERING

- Applied Soil Mechanics
- Foundation Engineering

ENVIRONMENTAL ENGINEERING

- Water & Wastewater Treatment Processes
- Solid and Hazardous Waste Management
- Membrane Separation Processes
- Air Quality Management

CONSTRUCTION ENGINEERING AND MANAGEMENT

- Application of Geomatics in Civil Engineering
- Modern Information Technology in Construction
- Water Resources Engineering
- Water Systems and Structures
- Water Supply and Distribution Management

TRANSPORTATION ENGINEERING

- Structure and Properties of Concrete Materials
- Traffic Engineering and Management
- Pavement Design and Performance

STUDENT WHO WANTS TO CONDUCT RESEARCH CAN CHOOSE THE FOLLOWING ELECTIVE COURSES:

- Interdisciplinary Design Project
- Individual Research Project in Civil Engineering I
- Individual Research Project in Civil Engineering II

MSc CIVIL & ENVIRONMENTAL ENGINEERING

YEAR 1	
Semester 1	Semester 2
Technical Communication	Research Method and Ethics
Advanced Applied Mathematics	Research Seminar
Finite Element Methods	Advanced Project Management
Advanced Soil Mechanics	Elective 1
Advanced Environmental Chemistry	Elective 2
YEAR 2	
Semester 1	Semester 2
MSc Thesis I	MSc Thesis II
Elective 3	Elective 4

LIST OF ELECTIVES:

- Structural Dynamics and Earthquake Engineering
- Advanced Concrete Technology
- Structural Evaluation and Rehabilitation
- Theory of Physico-chemical treatment processes
- Contaminated Site Management and Soil Treatment Technologies
- Environmental modeling development
- Computational Geomechanics
- Geotechnical Earthquake Engineering
- Advanced Foundation Engineering
- Building Information Modeling in Construction
- Estimating and Financial Management in Construction
- Principles and Applications of GIS and RS
- Renewable Energy
- Building Energy Analysis

MECHANICAL AND AEROSPACE ENGINEERING

WHAT IS MECHANICAL ENGINEERING?

Mechanical engineers are the general practitioners of the engineering profession and they are involved in essentially every engineering application. Mechanical engineers play key roles in a wide range of industries including automotive, aerospace, biotechnology, computers, electronics, microelectromechanical systems, energy conversion, robotics and automation, and manufacturing . Like other engineers, mechanical engineers use computers extensively. Mechanical engineers are routinely responsible for the integration of sensors, controllers, and machinery. Computer technology helps mechanical engineers create and analyze designs, run simulations and test how a machine is likely to work, interact with connected systems, and generate specifications for parts.

ACADEMIC PROGRAMS:

- **Bachelor of Engineering in Mechanical and Aerospace Engineering**
- **Master of Science in Mechanical and Aerospace Engineering**
- **PhD in Mechanical Engineering**

JOB OPPORTUNITIES:

The diversity within the Mechanical engineering curriculum provides graduates with a breadth of career opportunities including sales, marketing, management and design.

- **Drafters;**
- **Materials Engineering;**
- **Mechanical Engineering Technicians;**
- **Petroleum Engineers;**
- **Natural Sciences Managers;**
- **Nuclear Engineers;**
- **Physicists and Astronomers.**



BEng MECHANICAL & AEROSPACE ENGINEERING

YEAR 1	
Semester 1	Semester 2
Calculus I	Calculus II
Physics I	Physics II
Introduction to Engineering	Engineering Materials I
Programming for Engineers	Rhetoric & Composition
History of Kazakhstan	Kazakh I
YEAR 2	
Semester 1	Semester 2
Engineering Mathematics	Applied Statistics
Computer Aided Design	Numerical Methods in Engineering
Structural Mechanics I	Engineering Dynamics I
Environmental Chemistry	Materials and Manufacturing I
Technical Writing	Ethics
YEAR 3	
Semester 1	Semester 2
Fluid Mechanics I	Fluid Mechanics II
Engineering Thermodynamics	Engineering Dynamics II
Machine Elements Design	Computer Aided Engineering
Control Systems	Managerial Economics
Fundamentals of Entrepreneurship & Management	Elective 1
YEAR 4	
Semester 1	Semester 2
Capstone Project	Capstone Project
Heat Transfer	Elective 3
Mechanical Systems Design	Elective 4
Kazakh II	Elective 5
Elective 2	Elective 6

LIST OF ELECTIVES

- **Structural Mechanics II (TA: Materials & Manufacturing)**
- **Interdisciplinary Project - IDP**
- **Vehicle Propulsion Systems (TA: Aerospace Engineering)**
- **Heating Ventilating & Air Conditioning (TA: Thermofluids & Energy Applications)**
- **Oscillations of Mechanical Systems (TA: System Dynamics & Control)**
- **Computer Aided Geometric Design (TA: Design & Analysis)**
- **Fire Engineering (TA: Thermofluids & Energy Applications)**

- **Aerodynamics (TA: Aerospace Engineering)**
- **Flight Mechanics (TA: Aerospace Engineering)**
- **Materials and Manufacturing II (TA: Materials & Manufacturing)**
- **Feasibility Analysis of Clean Energy Technologies (TA: Thermofluids & Energy Applications)**
- **Fundamentals of Multi-Body Dynamics (TA: System Dynamics & Control)**
- **Advanced Control Systems and Industrial Automation (TA: System Dynamics & Control)**
- **Advanced Topics in Computational Fluid Dynamics (TA: Design & Analysis)**
- **Advanced Heat Transfer (TA: Thermofluids & Energy Applications)**

MSc MECHANICAL & AEROSPACE ENGINEERING

YEAR 1	
Semester 1	Semester 2
Technical Communication	Research Methods and Ethics
Advanced Applied Mathematics	Research Seminar
Finite Element Methods	Advanced CFD and Heat Transfer
Modern Control Engineering	Elective 1
Advanced Manufacturing Processes	Elective 2
YEAR 2	
Semester 1	Semester 2
MSc Thesis I	MSc Thesis II
Elective 3	Elective 4

LIST OF ELECTIVES

- **AREA: APPLIED MECHANICS:**

Advanced Statistics and Probability;
 Numerical Techniques for Engineers;
 Modern Control in Aerospace Engineering;
 Flight Dynamics Principles;
 Fatigue Fracture Mechanics;
 Biomechanics.

- **AREA: ENGINEERING DESIGN, MATERIALS, AND MANUFACTURING:**

Advanced Engineering Design and Manufacturing;
 Design and Manufacturing with Environmental Concern;
 Design Optimization;
 Advanced Computer Aided Engineering;
 Space Structures Design;
 Digital Transformation Concepts.

- **AREA: ENERGY AND THERMOFLUIDS:**

Advanced Conduction and Radiation applied to Mechanical Engineering;
 Aerospace Propulsion;
 Building Energy Analysis;
 Computational Fluid-Structure Interaction: Methods, Models and Applications;
 Renewable Energy.

ELECTRICAL AND COMPUTER ENGINEERING

WHAT IS ELECTRICAL ENGINEERING?

Electrical engineering is one of the newer branches of engineering, and dates back to the late 19th century. It is the branch of engineering that deals with the technology of electricity. Electrical engineers work on a wide range of components, devices and systems, from the power systems that bring electricity to our homes and communication systems that allow us to keep in touch with family and friends, to the electronic devices, computers, sensors and medical equipment that shape our everyday lives. Some of the most prominent pioneers in electrical engineering include Thomas Edison (electric light bulb), George Westinghouse (alternating current), Nikola Tesla (induction motor), Guglielmo Marconi (radio) and Philo T. Farnsworth (television).

ACADEMIC PROGRAMS:

- **Bachelor of Engineering in Electrical and Computer Engineering**
- **Master of Science in Electrical and Computer Engineering**
- **PhD in Electrical Engineering**

JOB OPPORTUNITIES:

Electrical and electronics engineers work primarily in research and development industries, engineering services firms, manufacturing and the federal government. Manufacturing industries that employ electrical engineers include automotive, marine, railroad, aerospace, defense, consumer electronics, commercial construction, lighting, computers and components, telecommunications and traffic control.

- **Electronic Engineer;**
- **Signal Processing Engineer;**
- **Power Engineer;**
- **Telecommunications Engineer;**
- **Computer Engineer;**
- **Control Engineer;**
- **Instrumentation Engineer.**



BEng ELECTRICAL & COMPUTER ENGINEERING

YEAR 1

Semester 1	Semester 2
Calculus I	Calculus II
Physics I	Physics II
Introduction to Engineering	Engineering Materials II
Programming for Engineers	History of Kazakhstan
Rhetoric and Composition	Kazakh I

YEAR 2

Semester 1	Semester 2
Differential Equations and Linear Algebra	Applied Statistics
Signals and Systems	Numerical Methods in Engineering
Introduction to Electrical Circuits	Solid State Devices
Digital Logic Design	Circuit Theory
Ethics	Technical Writing

YEAR 3

Semester 1	Semester 2
Electronic Circuits	Power System Analysis
Computer Architecture	Microprocessor Systems
Digital Signal Processing	Data Structures and Algorithms
Electrical Machines	Discrete Math Structures
Communication Systems	Interdisciplinary Design Project

YEAR 4

Semester 1	Semester 2
Capstone Project	Capstone Project
Managerial Economics	Fundamentals of Entrepreneurship & Management
Kazakh II	Elective 3
Elective 1	Elective 4
Elective 2	Elective 5

LIST OF ELECTIVES:

Devices and Circuits	Power Systems	Signal Processing and Communications Systems	Computer Engineering
	Power Amplifier and Wireless Transmitter Circuits	Digital Communications	Reconfigurable Computing and FPGAs
Digital Image Processing	Advanced Digital Signal Processing	Data Communications	Computer Networks
Analog Integrated Circuits	Power Electronics	Numerical Optimization Techniques for Engineers	Operating Systems
Digital Integrated Circuits	Power Transmission and Distribution Systems	Optical fiber communications	Parallel Computer Architecture
VLSI Design	High Voltage Engineering	Fundamentals of Photonics	System identification and control
MOS Device Modelling	Power System Protection	Digital Image Processing	Introduction to Computational Intelligence
Introduction to Computational Intelligence	Advanced Power System Analysis	Data Analytics	Modeling and Simulation
Logic Synthesis	Electric Power Generation	Introduction to Stochastic Modeling	Database Systems
RF Circuit Design	Industrial Electric Machinery	Advanced Digital Signal Processing	Introduction to Stochastic Modeling
RF Integrated Circuits	Microprocessor Systems	RF Circuit Design	Performance Evaluation of Computer Networks and Systems
High Frequency Electronic Devices	Computer Networks	RF Integrated Circuits	Wireless Networks
Digital Communications	Data Analytics	High Frequency Electronic Devices	Wireless Sensor Networks
Data Analytics	Numerical Optimization Techniques for Engineers	Wireless Sensor Networks	Introduction to Cybersecurity
Optical sensors and biosensors	Introduction to Cybersecurity	Wireless Networks	Data Analytics
Internship and Coop	Internship and Coop	Internship and Coop	Internship and Coop
Independent Study	Independent Study	Independent Study	Independent Study
Special Topics in ECE	Special Topics in ECE	Special Topics in ECE	Special Topics in ECE
	System identification and control		Wireless Networks

MSc ELECTRICAL & COMPUTER ENGINEERING

YEAR 1	
Semester 1	Semester 2
Technical Communication	Research Method and Ethics
Advanced Applied Mathematics	Research Seminar
Advanced Data Structures and Algorithms	System Modeling and Control
Embedded Systems and Applications	Elective 1
Statistics and Probability	Elective 2
YEAR 2	
Semester 1	Semester 2
MSc Thesis I	MSc Thesis II
Elective 3	Elective 4

LIST OF ELECTIVES:

Devices, Circuits and Systems	Power and Control Engineering	Signal Processing and Communication Systems	Computer Engineering
Advanced Electro-magnetics	Modern Electrical Engineering	Adaptive Signal Processing	Computer Communication Networks
Semiconductor Devices	Industrial and Commercial Power Systems	Wireless Communications	Parallel Computer Architecture
Advanced Topics in Mixed Signal Circuit Design	Advanced Power System Protection	Optical Communication	Computer and Network Security
Advanced Photonics	Advanced Power Electronics	Wireless Sensor Networks	Advanced Microprocessor Systems
RF Circuits	Renewable Energy	Communication Systems	Security of E-Systems and Networks

ROBOTICS AND MECHATRONICS

WHAT IS ROBOTICS AND MECHATRONICS?

Mechatronics is combination or junction of Electrical, Mechanical, and Computer Science Engineering. Mechatronics is the closest to Robotics with the slight and main difference in mechatronics systems inputs are provided whereas in robotics systems it acquires the inputs by their own. Robotics Engineering is the interdisciplinary branch of engineering and science that includes mechanical engineering, electrical engineering, computer science, and others. It deals with the design, construction, operation, and use of robots, as well as computer systems for their control, sensory feedback, and information processing.

ACADEMIC PROGRAMS:

- **Bachelor of Science in Robotic and Mechatronics**
- **Master of Science in Robotics**
- **PhD in Robotics Engineering**

JOB OPPORTUNITIES:

Robotics applications vary widely. Robots are used in the automotive, aerospace, metals, nuclear, mining, textile, and computer industries, among others. The robotics engineer must determine the particular needs of each application and customize the robot accordingly. Most robotics engineers are employed by private robot manufacturers or robot users. Some engineers work in military and space programs. Others work for colleges and universities or vocational and trade schools.

- **Robotics Engineer;**
- **Mechatronics Engineer;**
- **Maintenance Technician;**
- **Machine Operator;**
- **Research Assistant;**
- **Project Engineer;**
- **Field Service Technician;**
- **Welder.**



BSc ROBOTICS & MECHATRONICS

YEAR 1	
Semester 1	Semester 2
Calculus I	Calculus II
Physics I	Physics II
Programming	Performance and Data Structures
History of Kazakhstan	Rhetoric & Composition
YEAR 2	
Semester 1	Semester 2
Mechanics: Statics and Dynamics	System Dynamics and Modeling
Electrical and Electronic Circuits I	Electrical and Electronic Circuits II
Signals and Sensing with Laboratory	Microcontrollers with Lab
Linear Algebra with Applications	Introduction to Differential Equations
	COMM/SHSS elective
YEAR 3	
Semester 1	Semester 2
Mechanical Design with CAD	Electromechanical Systems
Linear Control Theory	Robotics I: Kinematics and Dynamics
Major Elective 1	Major Elective 2
Natural Science Elective 1	Probability
Kazakh Language Course 1	Kazakh Language Course 2
YEAR 4	
Semester 1	Semester 2
Robotics II: Control, Modeling and Learning	Robotic/Mechatronic System Design
Major Elective 3	Major Elective 4
Ethics	Graduation Project
Natural Science Elective 2	Business Fundamentals & Entrepreneurship
HSS Elective	

MSc ROBOTICS

YEAR 1	
Semester 1	Semester 2
Software Principles and Practice	Hardware Software Co-Design
Robot Manipulation and Mobility	Robot Perception and Vision
Dynamic Systems and Control	Innovation and Entrepreneurship
Teaching and learning	Teaching Practicum
Research Methods	Research Seminar
YEAR 2	
Semester 1	Semester 2
Elective 1	Thesis
Elective 2	
Elective 3	
Laboratory Practicum	
Thesis Proposal	

BSc COMPUTER SCIENCE

YEAR 1	
Semester 1	Semester 2
Calculus I	Calculus II
Physics I with Lab	Physics II with Lab
Programming for Scientists and Engineers	Performance and Data Structures
History of Kazakhstan	(CORE Communications 1)
YEAR 2	
Semester 1	Semester 2
Computer Systems & Organization	Formal Languages
Programming Languages	Algorithms
Linear Algebra with Applications	Microcontrollers with Lab
Discrete Mathematics	Probability
SSH Communications 2	Kazakh Language 1
YEAR 3	
Semester 1	Semester 2
Artificial Intelligence	Computer Networks
Database Systems	Operating Systems
Software Engineering	Research Methods
Natural Science Elective 1	Natural Science Elective 2
Kazakh Language 2	CORE Entrepreneurship
YEAR 4	
Semester 1	Semester 2
Senior Project I	Senior Project II
Technical Elective 1	Technical Elective 3
Technical Elective 2	Technical Elective 4
Free Elective 1	CORE Ethics
SSH Social Science	

LIST OF TECHNICAL ELECTIVES

- **Systems Analysis and Design**
- **Software Project Management**
- **Human-Computer Interaction**
- **High Performance Computing**
- **Mobile Computing**
- **Advanced Mobile Computing**
- **Ubiquity and Sensing**
- **Data Mining and Visualization**
- **Intelligent Systems**
- **Information Security**
- **Scripting Languages**
- **Open Source Software**
- **Complexity and Computability**
- **Deep Learning**
- **Internship I**
- **Internship II**
- **Directed Study**
- **Introduction to Numerical Methods**
- **Introduction to Graph Theory**
- **Cryptography**
- **Computational Physics**
- **Applied Computational Physics**
- **Image Processing**
- **Machine Learning: Theory and Practice**
- **Brain Computer Interface**

LIST OF CORE CS COURSES

- Programming for Scientists and Engineers
- Performance and Data Structures
- Computer Systems & Organization
- Computer Networks
- Database Systems
- Microcontrollers with Lab
- Research Methods
- Programming Languages
- Software Engineering
- Artificial Intelligence
- Senior Project I
- Senior Project II
- Algorithms
- Formal Language

MSc COMPUTER SCIENCE

YEAR 1	
Semester 1	Semester 2
Software Principles and Practice	Systems Elective
CS Theory Elective	AI / Intelligent Systems Elective
Technical Elective 1	Technical Elective 2
Technical Communication	Teaching Practicum
Research Methods	Research Seminar
YEAR 2	
Semester 1	Semester 2
Technical Elective 3	Thesis
Technical Elective 4	
Technical Elective 5	
Laboratory Practicum	
Thesis Proposal	

CHEMICAL AND MATERIALS ENGINEERING

WHAT IS CHEMICAL ENGINEERING?

Chemical engineers are in great demand because of the large number of industries that depend on the synthesis and processing of chemicals and materials. In addition to traditional careers in the chemical, energy and oil industries, chemical engineers enjoy increasing opportunities in biotechnology, pharmaceuticals, electronic device fabrication and environmental engineering. Chemical engineers apply the principles of chemistry, biology, physics, and math to solve problems that involve the production or use of chemicals, fuel, drugs, food, and many other products. They design processes and equipment for large-scale manufacturing, plan and test production methods and byproducts treatment, and direct facility operations. In addition, chemical engineers work in the production of energy, electronics, food, clothing, and paper. They must understand how the manufacturing process affects the environment and the safety of workers and consumers.

ACADEMIC PROGRAMS:

- **Bachelor of Engineering in Chemical and Materials Engineering**
- **Master of Science in Chemical and Materials Engineering**
- **PhD in Chemical Engineering**

JOB OPPORTUNITIES:

Many chemical engineers work in industries whose products are sought by many manufacturing firms. For instance, they work for firms that manufacture plastic resins, which are used to increase fuel efficiency in automobiles. Increased availability of domestically produced natural gas should increase manufacturing potential in the industries employing these engineers. In addition, chemical engineering will continue to migrate into dynamic fields, such as nanotechnology, alternative energies, and biotechnology, and thereby help to sustain demand for engineering services in many manufacturing industries.

- **Biomedical Engineers;**
- **Chemical Technicians;**
- **Chemists and Materials Scientists;**
- **Nuclear Engineers;**
- **Occupational Health and Safety Specialists and Technicians;**
- **Energy Engineer;**
- **Petroleum Engineer;**
- **Manufacturing Engineer.**

BEng CHEMICAL & MATERIALS ENGINEERING

YEAR 1	
Semester 1	Semester 2
Calculus I	Calculus II
Physics I	Physics II
Introduction to Engineering	Engineering Materials II
Programming for Engineers	Kazakh I
History of Kazakhstan	Rhetoric & Composition
YEAR 2	
Semester 1	Semester 2
Differential Equations and Linear Algebra	Applied Statistics
Basic Principles and Calculations in Chem. Eng.	Numerical Methods in Engineering
Inorganic and Analytical Chemistry	Fluid Mechanics
Chemical Engineering Thermodynamics	Organic and Polymer Chemistry
Technical Writing	Ethics
YEAR 3	
Semester 1	Semester 2
Instrumental Methods of Analysis for Engineers	Separation Processes
Heat and Mass Transfer	Chemical Reaction Engineering
Applied Mathematics for Process Design	Chemical Engineering Lab 1
Fundamentals of Entrepreneurship & Management	Managerial Economics
Elective 1	Interdisciplinary Design Project
YEAR 4	
Semester 1	Semester 2
Capstone Project	Capstone Project
Process Design and Simulation	Materials Chemistry
Chemical Engineering Lab 2	Chemical Process Control and Safety
Language and Ethnicity	Elective 3
Elective 2	Elective 4

LIST OF ELECTIVES:

CHEMICAL ENGINEERING COURSES:

- Atmospheric Chemistry and Physics
- Environment and Development
- Process Design for Environmental Applications
- Advanced Process Simulation
- Industrial Wastewater Treatment and Reclamation

- **Multiphase Systems**
- **Advanced Transport Phenomena**
- **Heterogeneous Reactor Engineering**
- **Colloids and Surface Science**
- **Advanced Chemical Process Safety and Risk Modeling**

MATERIALS ENGINEERING COURSES:

- **Electrochemical Engineering**
- **Corrosion Protection in Oil and Gas Industry**
- **Biomechanics**
- **Tissue Engineering**
- **Polymer Processing and Rheology**
- **Powder Technology**

MSc CHEMICAL & MATERIALS ENGINEERING

YEAR 1	
Semester 1	Semester 2
Advanced Applied Mathematics	Research Methods and Ethics
Technical communication	Research Seminar
Advanced Materials Processing	Advanced Heat and Mass Transfer
Advanced Materials Characterization Methods	Elective 1
Advanced Chemical Reaction Engineering	Elective 2
YEAR 2	
Semester 1	Semester 2
MSc Thesis I	MSc Thesis II
Elective 3	Elective 4

LIST OF ELECTIVES:

- **Computational Fluid Dynamics in Chemical and Materials Engineering**
- **Advanced Chemical Thermodynamics**
- **Computer-Aided Process Design for Petrochemical Industry**
- **Crude Oil Processing**
- **Advanced Safety, Reliability, and Risk Engineering in Process Industries**
- **Emerging Pollutants: Sources, Fate, and Control**
- **Analysis of Exposure to Toxic Chemicals**
- **Polymer Melt Fluid Mechanics and Processing**
- **Advanced Powder Processing**
- **Food Engineering and Processing**
- **Porous and Powder Materials Characterization**
- **Advanced Materials for Environmental and Biomedical Applications**

BIOMEDICAL ENGINEERING

WHAT IS BIOMEDICAL ENGINEERING?

Biomedical Engineering is the study of medical equipment used in an environment of care or training and how this equipment interfaces with the human body. Bioengineers work with doctors, therapists and researchers to develop systems, equipment and devices in order to solve clinical problems. Biomedical engineers have developed a number of life-enhancing and life-saving technologies. These include:

- Prosthetics, such as dentures and artificial limb replacements.
- Surgical devices and systems, such as robotic and laser surgery.
- Systems to monitor vital signs and blood chemistry.
- Implanted devices, such as insulin pumps, pacemakers and artificial organs.
- Imaging methods, such as ultrasound, X-rays, particle beams and magnetic resonance.

ACADEMIC PROGRAMS:

- **Master of Science in Biomedical Engineering**

JOB OPPORTUNITIES:

- **Biomechanical engineer**
- **Rehabilitation engineer**
- **Bioengineering researcher**
- **Clinical engineer**
- **Product Engineer**
- **Biomedical physiotherapist**



MSc BIOMEDICAL ENGINEERING

YEAR 1	
Semester 1	Semester 2
Advanced Applied Mathematics	Research Method and Ethics
Technical Communication	Research Seminar
Anatomy and Physiology	Regenerative Medicine / Tissue Engineering
Biosensors	Ethics for Biomedical Engineers
Biomaterials Science & Engineering	Elective

YEAR 2	
Semester 1	Semester 2
Research Project I	Research Project II
Elective	Elective

LIST OF ELECTIVES:

- **Strategies for Controlled Topical Delivery of Drugs**
- **Microbiology**
- **Diagnostic Methods and Clinical Chemistry**
- **Medical Device Technology**
- **Infectious Diseases and Antimicrobial Strategies**
- **Clinical Imaging Techniques**
- **Biomedical Engineering Design**
- **Mechanics of Living Tissues**
- **Biosensors laboratory**
- **Biomaterials laboratory**
- **Tissue Engineering/Regenerative Medicine laboratory**
- **Biomechanics lab**

ENGINEERING MANAGEMENT

WHAT IS ENGINEERING MANAGEMENT?

The Master of Engineering Management (MEM) degree program is a specialized degree program offered by the School of Engineering and Digital Sciences (SEDS) in partnership with the Graduate School of Business (GSB) at Nazarbayev University (NU). The aim of the program is to prepare students with the technical skills and business knowledge for leadership of engineering-related units of enterprises with innovative solutions for complex business problems.

The MEM program emphasizes adapting and applying analytical skills and scientific knowledge into business practice. Students learn about project management, operations management, supply chain management, engineering management, engineering economy, quality and lean management, marketing, R&D management, new product development, entrepreneurship, business ethics, business strategy, business communication, leading change and innovation, and many other aspects of managing a successful business.

It is the School mission to train the future scholars of Kazakhstan. By delivering the Master of Engineering Management program at an international standard level, we are offering our master's students new opportunities in terms of Ph.D. and positions in research centers, here or abroad.

ACADEMIC PROGRAMS:

- **Master of Engineering Management**

JOB OPPORTUNITIES:

- **Engineering Project Manager**
- **Senior Lead Analyst**
- **Cost Systems Analyst**
- **Industrial and System Management Engineer**



MASTER OF ENGINEERING MANAGEMENT

YEAR 1	
Semester 1	Semester 2
Advanced Statistics and Probability	Accounting
Research Methods & Ethics	Management of Organizations
Engineering Management and Economy	Finance
Project Management	Marketing
Elective	Business Strategy
	Entrepreneurship
	Leading Change
	Business Communication
YEAR 2	
Semester 1	Semester 2
Production and Service Operations Management	Capstone Project
Supply Chain Management	Managing Product and Service Development
Engineering Decision Tools	Elective
Elective	
Elective	

LIST OF ELECTIVES:

- **Operations Research Methods**
- **Knowledge Management & Innovation**
- **Big Data and Information Management**
- **Globalization and Engineering**
- **Quality and Lean Management**
- **Systems Engineering**

DATA SCIENCE

WHAT IS DATA SCIENCE?

Data science is the study of where information comes from, what it represents and how it can be turned into a valuable resource in the creation of business and IT strategies. Mining large amounts of structured and unstructured data to identify patterns can help an organization rein in costs, increase efficiencies, recognize new market opportunities and increase the organization's competitive advantage. Advancements in technology helped data science evolve from cleaning datasets and applying statistical methods to a field that encompasses data analysis, predictive analytics, data mining, business intelligence, machine learning, deep learning, and so much more.

ACADEMIC PROGRAMS:

- **Master of Science in Data Science**

JOB OPPORTUNITIES:

Currently, there is a huge need for skilled and certified Data Science professionals. They are among the highest-paid professionals in the IT industry. The main job titles offered in data science:

- **Data analyst**
- **BI analyst**
- **Data engineer**
- **Data architect**
- **Data scientist**



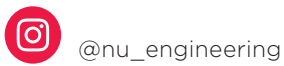
MSc DATA SCIENCE

YEAR 1	
Semester 1	Semester 2
Fundamentals of Data Science	Statistical Analysis
Probability and Statistics for Data Science	Data Mining and Decision Support
Database Management Systems	Big Data Analytics
Process and Project Management	Innovation and Entrepreneurship
Research Methods	Research Seminar
YEAR 2	
Semester 1	Semester 2
Technical Elective 1	Thesis
Technical Elective 2	
Technical Elective 3	
Data-Driven Innovation	
Thesis Proposal	

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