Jerusalem + Galilee Engineers (JGE) 2019

ROTHBERG INTERNATIONAL SCHOOL

THE HEBREW UNIVERSITY OF JERUSALEM

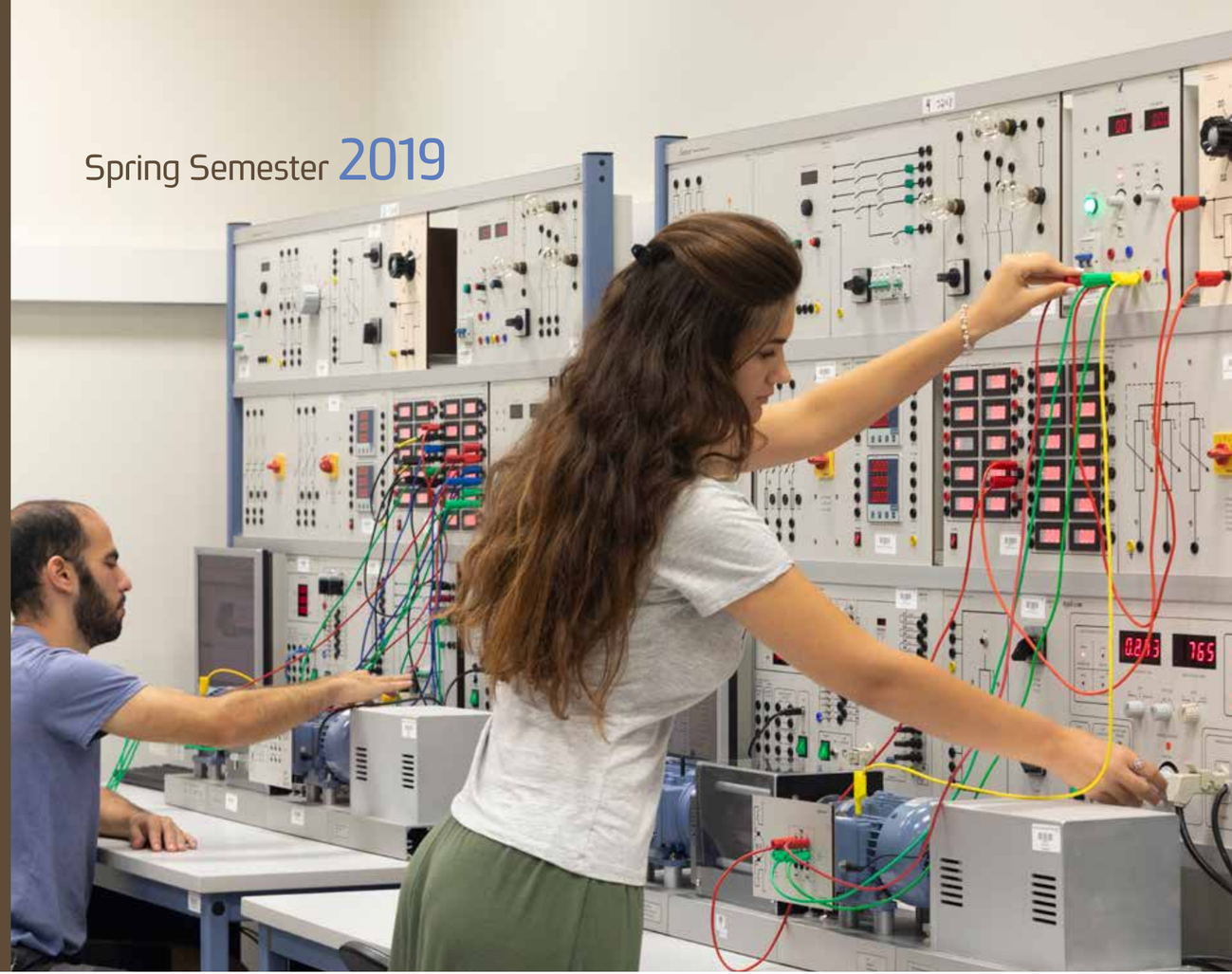
Braude College

Jerusalem-Galilee Engineers (JGE) Study Abroad Program

in

The Hebrew University, and ORT Braude College, Israel

Spring Semester 2019



Welcome to Braude College

Braude College strives for excellence in teaching and research in the fields of engineering and the sciences. We achieve this by empowering the individual and establishing strong ties with industry, academia, and the community.

Braude College plays an important role in the development and prosperity of the Galilee and its communities, and attracts a diverse range of students, many of whom choose to live and work in the region following graduation. The college increases accessibility to higher education in engineering and the sciences for inhabitants of the region. At Braude College, a firm dedication to high academic standards ensures the quality of our graduates, providing them with the education and skills they need to meet their personal and professional goals in the fields of engineering most highly in demand today.

At Braude College, we cultivate independent learning to prepare students for their futures as engineers in a fast-changing technological world. We invest substantial resources in training, improved teaching methods, and student support systems, to create an environment that is both nurturing and challenging.

Prof. Arie Maharshak
President

Continent:

Asia

Region:

Western Asia
Middle East

Size:

20,770 km²

Neighboring Countries:

Lebanon, Syria, Jordan, Palestinian Authority, Egypt

Geography:

Coastal plain

Central mountains

Southern desert

Language:

Religions:

16.8% **Muslim**

75.5% **Jewish**

2.1% **Christian**

5.6% Other

Natural Resources:

timber, potash, copper ore, natural gas, phosphate rock, magnesium bromide, clays, sand

Agriculture:

citrus, vegetables, cotton, beef, poultry, dairy products

Population:

8,500,000

Climate:

cool and mild winters

6°c-15°c

hot and dry summers

18°c-30°c

Industry:

electronics, wood and paper products, potash and phosphates, food, beverages, and tobacco, caustic soda, cement, construction, metals products, chemical products, plastics, diamond cutting, textiles, footwear

Average Life Expectancy:

81.28

Capital City:

791,000

Monetary Unit:

Yearly Rainfall:

60cm
(average) mostly in winter

Plant Life:

- Vines
- Fig
- Olive
- Citrus trees
- Banana
- Avocado
- Palm
- Oak
- Broom
- Numerous Wildflowers

Animal Life:

- Jackal
- Hyena
- Wild boar
- Gazelle
- Fox
- Deer

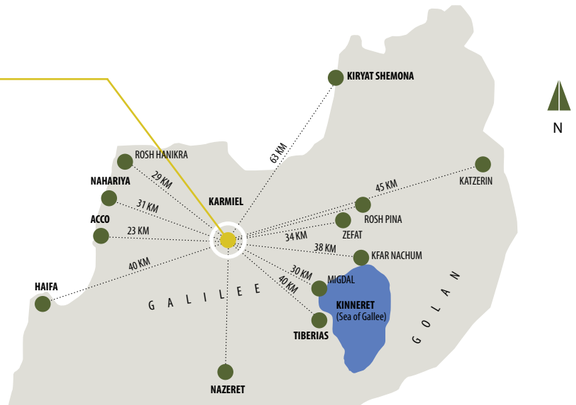
Bird Life:

many different species including:

- Buzzard
- Pelican
- Starling
- Vultures

International country code:

IL +972



Galilee

Braude College is perched on a hill in the city of Karmiel, which divides the upper and lower Galilee. The Galilee is a mountainous region in the north of Israel, characterized by rocky hills, green fields and colorful wildflowers. Its relatively abundant water and fertile soil have made for thriving wildlife and thousands of years of human settlement.

The Galilee houses a tapestry of ethnic communities. Alongside Jewish cities and towns, there are Arab, Druze, and Circassian villages.

A hub of tourism, the Galilee offers antiquities, parks, nature reserves, and religious sites. The Galilee is also a center of arts and culture, and of industry. Numerous high-tech companies are located here, having drawn some of Israel's finest scientists to the region. The natural beauty, historical and archeological sites, cultural diversity, and innovative industries make the Galilee a fascinating region, with something to interest almost all visitors.

Engineering and More: Jerusalem-Galilee

Jerusalem-Galilee Engineers is an innovative program offered by the Hebrew University of Jerusalem and Braude College. The semester-long program, conducted in English, is designed for engineering students in their third or fourth year of studies. Participants take accredited courses in engineering and other academic subjects. Ample opportunities are available to become acquainted with the vibrant, multifaceted State of Israel, and its people.

The program begins with a two-week mini-semester at the Hebrew University of Jerusalem, where students take an introductory course in Israeli Society. The course includes stimulating study tours throughout Jerusalem and other parts of the country.

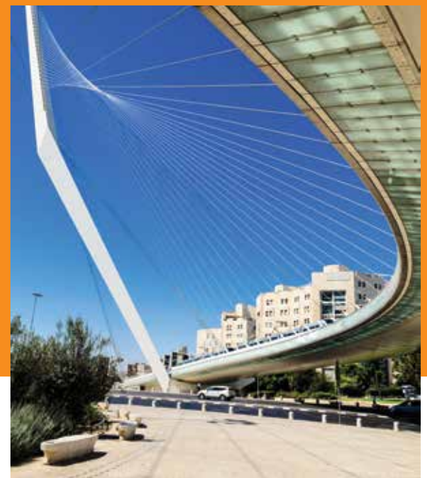
The program continues in Karmiel, the "capital" of the Galilee, at Braude College. At this topnotch technological institution, students study engineering courses for 16 weeks. They also take part in the unique Study in Advanced Industry program, in which they visit leading high-tech companies.

Jerusalem

From the hilltop of Mount Scopus, the Hebrew University looks out over the spectacular panorama of Jerusalem. A city sacred to Judaism, Christianity and Islam, Jerusalem is a blend of past and present, ancient roots and modern innovations.

Jerusalem is well known for its abundant historical and holy sites, and fascinating tourist attractions. A thriving metropolis, Jerusalem is dotted with art galleries and museums, theaters and concert halls, archaeological sites and religious shrines. Throughout the year, the city hosts exciting festivals, exhibitions, international conferences, and other special events.

As the capital of Israel, Jerusalem is not only the home of the country's governing bodies, national memorials and cultural institutions, but also a political center of national and international significance.



The Hebrew University of Jerusalem Rothberg International School

The Hebrew University of Jerusalem is a multi-disciplinary institution of higher learning and research, and a scientific center of international repute. Ranked among the world's leading universities, the Hebrew University stresses excellence throughout its Faculties of Humanities, Social Sciences, Law, Science, Medicine, Dental Medicine, and Agriculture, Food and Environment.

The university has 22,000 undergraduate, graduate and doctoral students. Its 1,200 faculty members and alumni have been awarded numerous national and international prizes, including the Nobel Prize.

In 1955 the Hebrew University opened its first program for international students with 22 American students. Since then, the programs and courses for students from abroad have steadily expanded. Today, the Rothberg International School attracts more than 2,000 students annually, from over 90 countries around the globe.

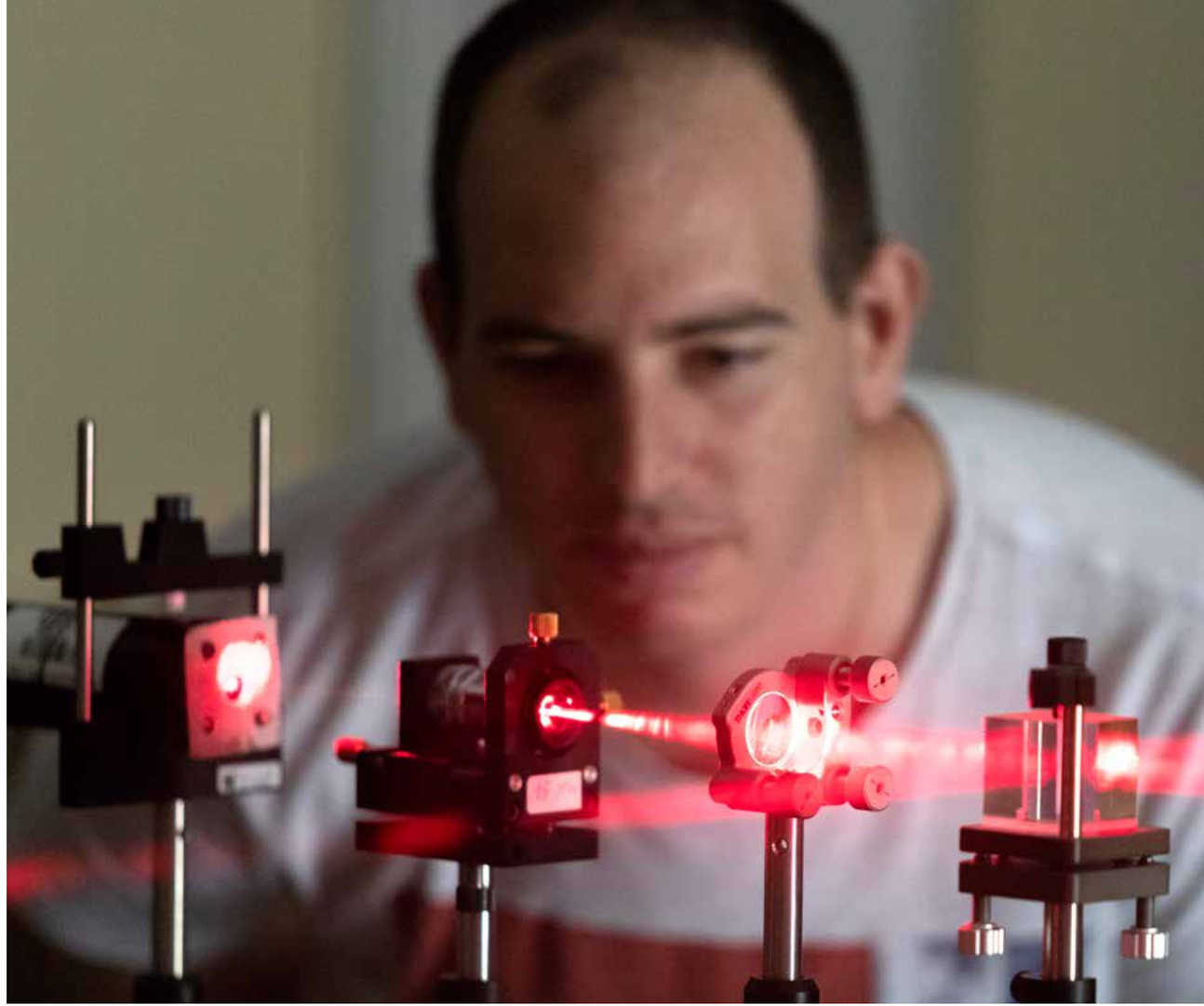
Braude College of Engineering in Karmiel

Braude College, based in the city of Karmiel, is a leading engineering institution in northern Israel. Established in 1987, the beautifully landscaped college has about 3,000 undergraduate and graduate students.

An academic, technological and scientific center in the Galilee, Braude College helps develop local high-tech industries.

Braude College offers B.Sc. degrees in biotechnology engineering, electrical and electronic engineering, industrial engineering and management, information systems engineering, mechanical engineering, software engineering, applied mathematics and optical engineering. The college confers M.Sc. degrees in biotechnology, software engineering, industrial engineering and systems engineering.

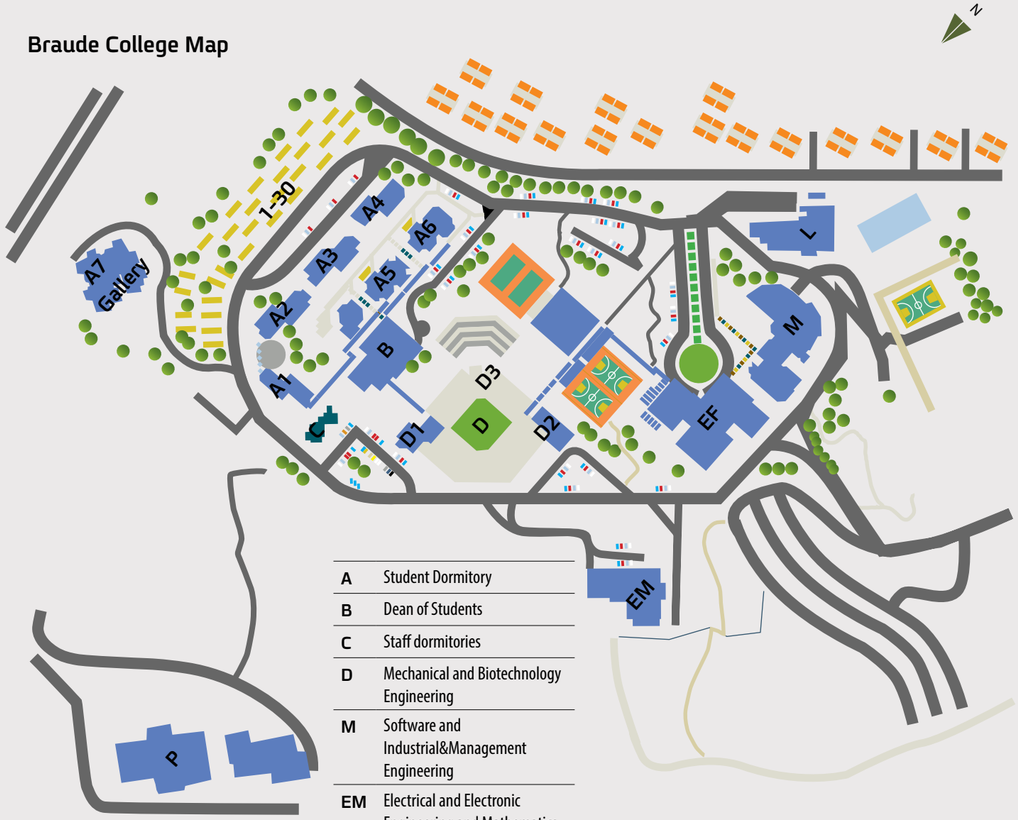
At Braude College, each student is valued, and receives personal attention from faculty and staff. Students also benefit from the college's connection with top-ranking industries.



Braude College

Mechanical Engineering	Electrical & Electronic Engineering	Software Engineering	Optical Engineering	Biotechnology Engineering	Industrial and Management Engineering	Applied Mathematics	General Studies
Mechatronics	Computers	Algorithms		Food	Management and Services		
Polymers	Signal Processing Communication	Signals and Communication		Bio-Molecular	Science and Technology		
Bio-Mechanics	Devices & Systems	Software Engineering		Environmental	Information Systems		
Design and Manufacturing					Management		

Braude College Map



A	Student Dormitory
B	Dean of Students
C	Staff dormitories
D	Mechanical and Biotechnology Engineering
M	Software and Industrial&Management Engineering
EM	Electrical and Electronic Engineering and Mathematics
L	Classrooms
P	Optical Engineering

Jerusalem-Galilee Engineers Program

The program is divided into two sections:

Mini-Semester at

+ THE HEBREW UNIVERSITY OF JERUSALEM

The program begins in Jerusalem, with a two-week mini-semester designed to introduce the students to Israeli society and culture. Students participate in the following course:

Introduction to Israeli Society

Academic hours: 30
Academic credits: 2

This course examines historical, social and political aspects of contemporary Israeli society. After analyzing the ideologies and groups that played a major role in the formation of Israeli society, class discussion will focuses on social and political issues which are at the center of current debate in the country.

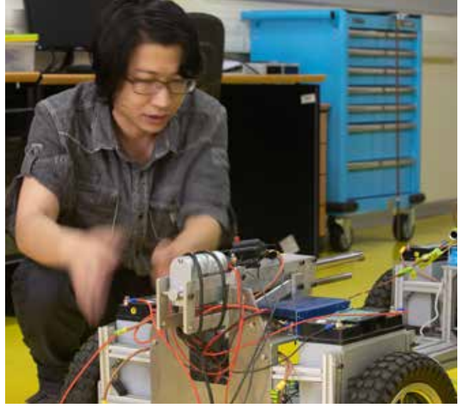
Spring Semester at

+ BRAUDE COLLEGE

The spring semester comprises 15 weeks, from March to July. Students benefit from an expert faculty, strong support network, small study groups, and personal attention. The projects related to leading Israeli companies which program participants are required to complete, expose students to real-world engineering challenges and valuable professional contacts.

Braude College combines theory with practical laboratory experience and exposure to local high tech industries.

Students will enjoy an extensive series of stimulating academic field trips and extra-curricular activities, designed to enable students to experience Israeli society and culture first-hand.



Courses in English at Braude College:

SOFTWARE

Machine Learning

Academic hours: 42

The course deals with Machine Learning concepts. Among other topics, the course covers major models in the field: Supervised Learning, Reinforcement Learning, Un-supervised Learning. Students will also be exposed to linear models like: SVM, Rule Learning and Distance Base Models.

Topics in Algorithmic Game Theory

Academic hours: 42

Game theory deals with the analysis of strategic situations which involve players with conflicting goals and attempts to answer questions such as what is the best strategy for each participant and how to predict the outcome of a given game. The purpose of the course is to review a variety of topics related to the encounter between three areas: economics, game theory and computer science. The course will include lectures that develop the relevant theory and discuss the related practical applications. The course begins with a short introduction to game theory. We will then review a variety of of classic topics and contemporary issues.

Algorithms Design

Academic Academic hours: 42

Algorithm design is a specific method to create a mathematical process in solving problems. Techniques for designing and implementing algorithm design include: problem definition, development of a model, specification of algorithm, designing an algorithm, checking the correctness of algorithm, analysis of algorithm, implementation of algorithm, program testing, and documentation preparation. The course will include lectures, workshop and presentations by students.

Machine Learning

Academic hours: 42

The course deals with Machine Learning concepts. Among other topics the course covers major models in the field: Supervised Learning, Reinforcement Learning and Un-supervised Learning. Students will also be exposed to linear models such as OR including: SVM, Rule Learning and Distance Base Models.

Seminar in Randomized Algorithms

Academic hours: 42

In the first part of the course, the course supervisor will give several introductory lectures on topics including the topics: the role of randomized algorithms, Las Vegan vs Monte Carlo algorithms, analysis of exemplary algorithms of each type, and tools in probabilistic analysis. In the second part of the course, the students will be given relevant literature to read under the guidance of the supervisor and will then present to the class.

Introduction to Artificial Intelligence

Academic hours: 42

The course will provide an introduction to the fundamental concepts techniques of Artificial Intelligence. The basic idea of Agents, and Multi Agent Systems in a wide range of decision making. Topics covered in the course include: problem solving and search methods, logic and knowledge representation, reasoning and decision-making in uncertainty conditions, and supervised machine learning. The course combines the theoretical foundations of artificial intelligence and hands-on experience with methods, techniques and tools used to build intelligent systems.

PHYSICS

Modern Physics

Academic hours: 56

An introductory course to the field of modern physics, designed as a general overview for engineering students, the course includes. The course includes the following topics: basics of geometrical optics, optical devices, wave theory, blackbody, radiation, photons, an introduction to quantum theory, principles and concepts of modern physics, applications of modern physics in various engineering fields, and applications of modern physics, in particular, in biotechnology. Another topic in the course focuses on understanding of the process of constructing a scientific theory: induction and deduction.

Light Sources and Lasers

Academic hours: 56

This course covers the fundamental physical processes of lasers, introduces relevant engineering and explores a variety of specific laser systems. In the first part of the course, the principles and main features of black body radiation and incoherent sources are introduced. The main part of the course focuses on the physical principles, structure, and operation modes of optical lasers. Topics include absorption/emission and optical gain, population inversion in three and four-level systems, laser oscillator, resonator and beam propagation, modes structure and methods of mode-selection, Q switching, and phase locking. In addition, laser applications are addressed. The course also includes plenty of relevant exercises relating to technical problems and solutions which will be carried out during the practical sessions.

Optical imaging systems

Academic hours: 42

This course covers the basic principles of optical imaging systems. Starting from the fundamentals of the diffraction theory of light, the main features, limitations, and engineering aspects of imaging systems are covered. Topics include diffraction-limited imaging, optical modulation function and modulation contrast function, contrast-limited resolution and target acquisition, and noise-limited imaging and target acquisition. In addition, the effects of atmosphere, turbulence, and motion on image quality are treated. Furthermore, the structure and main characteristics of imaging devices are covered. In the practical session, relevant exercises on imaging systems characterization and design are solved.

Interferometry and Interferometric Microscopy

Academic hours: 42

The course covers the following topics: wave optics, Interferometry as the most accurate ruler in nature, an overview of the Michelson Interferometer: from special relativity to the LIGO Interferometer, two-wave Interferometry, additional Interferometers, holography, coherence, alignment of an interferometer.

MECHANICAL

Manufacturing Processes

Academic hours: 42

This course looks at manufacturing technologies from the shop floor perspective, along with professional literature, scientific/academic and trade magazines and technical databases. Students use analysis tools and decision-making methodologies to optimize production lines, and suggest manufacturing layouts and solutions for commercial/industrial systems.

Industrial Automation

Academic hours: 70

In this introductory course, students learn about automation technologies and manufacturing systems. The rationale for utilizing automation is explored, along with the advantages of both hardware and software-based automation. Laboratory experience is also included in the course.

Transport Phenomena Laboratory

Academic hours: 28

In this course the student practices knowledge related to Fluid Mechanics and Heat Transfer, with emphasis on tools and measurement techniques. The lab sessions include experiments in: flow rate and regimes, pressure drops in pipes and devices, heat transfer (conduction, convection, and radiation), pumps, wind tunnel, and heat exchange systems.

Strength and Materials Laboratory

Academic hours: 42

The aim of this course is to teach the student experimental techniques, design of experiment, correct procedures of experimental work, result analysis, and presentation of the process and results. The course includes the following topics: torsion, hardness of materials, stress and strain, bending, stress concentration, thermal treatment and aging of metals, manual and computer aided and automated geometrical measurements.

Advanced Materials Engineering

Academic hours: 28

The goal of this course is to expose the student to advanced topics of materials engineering. The student will gain knowledge and techniques for applying materials engineering principles in order to solve engineering problems and to estimate the influence of various processes on the mechanical properties of certain groups of alloys. Another important aspect of the course is to understand the connection between microstructural phenomena and mechanical behavior of materials. At the end of the course, students will present a research problem and its investigation process.

Biomaterials

Academic hours: 70

Biomaterials course is intended to introduce the students to the uses of artificial/synthetic materials in the human body for the purposes of aiding healing, correcting deformities, and restoring lost function. The course reviews basic concepts of chemical bond, materials structures and the resulting chemical and physical properties of metals, ceramics, polymers and composite materials.

Rehabilitation biomechanics

Academic hours: 42

The course surveys the field of rehabilitation engineering with an emphasis on human machine interface,and sensory physical and cognitive applications, while implementing existing technologies. The course reviews different rehabilitation systems and design essentials of these systems. The course provides insight to activities of daily living (ADL), and challenges of the disabled community, while reviewing the existing solutions offered. This hands-on course offers the students small scale projects intended for a real client for whome they will develop and manufacture a tailor made solution while implementing the knowledge gained during the course.

Introduction to Polymers and Plastics

Academic hours: 56

This course begins with terminology and concepts of plastics, and examines the molecular weight, structure and morphology of thermoplastic and thermoset polymers. It teaches properties of solid polymeric material and intermolecular interactions, along with evaluation methods of polymers and plastics. Polymeric elastomers and viscoelasticity analysis are also included.

Vibration Theory

Academic hours: 56

This course lays the foundation for analyzing vibrating systems and understanding some physical phenomena unique to systems undergoing harmonic excitation. The course introduces basic concepts through simple single degree-of-freedom systems. Two degree-of-freedom systems are used to introduce more complex behaviors not present in single degree-of-freedom systems, and finally expands to multi degree-of-freedom systems and introductory continuous systems. Topics of the course include: Kinematics of vibrations and harmonic motion. Unforced and forced single degree-of freedom systems motion, Steady state and transient response, Resonance, Vibration based sensors, Vibrating base and vibration isolation. Lagrange equations and their use in developing equations of motion for multi degree-of-freedom systems. Unforced and forced motion of multi degree-of-freedom systems and dynamic damping.

Introduction to modal analysis. Introduction to vibrating continuous systems – vibrating string, longitudinal vibration in a rod, vibrating beam.

Introduction to Flight Mechanics

Academic hours: 42

The purpose of the course is to introduce the students to the aerial sciences. The course gives a background and introduction to the mechanics of flight utilizing basic tools obtained in the field of dynamics and fluid mechanics to introduce a complex mechanical application. Topics of the course include: Background and introduction to mechanics of flight. Basic aerodynamics: principles and foundational equations of fluid motion, various flow regimes and their classification, standard atmosphere, Introduction to airfoil theory, aerodynamic forces and moments, finite wing corrections. A survey of aeronautical propulsion methods. Performance of aerial vehicles: Straight level flight, Takeoff and landing, Climb and glide, Turns, Flight envelope.

Fluid Mechanics

Academic hours: 70

Introduction. Hydrostatics: manometers, forces on immersed bodies. Fluid dynamics: Integral conservation laws, Bernoulli equation, differential conservation Laws, Navier-Stokes and Euler equations. External flows around immersed bodies: boundary layers, potential flow, lift, drag, wing profiles. Internal flows: Laminar flow in ducts and pipes, turbulent flow in pipes. Flow measuring devices. Pumps. Dimensional analysis and similarity. Introduction to compressible flow.

Introduction to Mechatronic Systems

Academic hours: 70

This course is an overview of mechatronic systems. The students study principles of microcontroller, Microcontroller programing , Digital and analog I/O, Theory of measuring systems, Sensors for measuring: force, displacement, temperature, acceleration, etc. Actuators: DC brush and brushless motors, stepper motors, modeling a position control system, introduction to signal processing, design and implementation of digital position controller, and autonomous mechatronic system. The course includes a laboratory segment.

Engineering biomaterials and implantable devices

Academic hours: 28

This interdisciplinary course provides an introduction to materials used in medical applications and covers the principles of materials science and cell biology underlying the design and performance of implantable devices. The course focus is on orthopaedic and cardiovascular implants, on mechanisms underlying wound healing and tissue remodeling following implantation, and on materials variables that control implant biocompatibility and clinical performance. Materials-related implant failures and serious medical device recalls are reviewed. The course uses a combination of lectures and student presentations.

Fundamentals of Combustion Processes

Academic hours: 28

Introduction. Ideal combustion: Chemical species balance. Adiabatic flame temperature. Equilibrium combustion: Gibbs function. Equilibrium condition. Equilibrium constant. Chemical kinetics: Rate equation. Chemical mechanism. Characteristic combustion time. Reactors: Constant volume reactor. Constant pressure reactor. Well-stirred reactor. Premixed flames: Flame speed. Ignition. Combustion limits. Flame holding. Diffusion Flames. Droplet evaporation: d-squared law. Gas turbine combustors. Internal combustion engine combustors. Rocket engines. Heterogeneous combustion.

Introduction to Finite Element Analysis

Academic hours: 56

The course objective is to teach the theory of finite elements for heat conduction and structural mechanics problems, the fundamentals of using a finite element code to solve engineering problems, including choosing a model, meshing, refining, and checking for errors. The course is aimed to enhance the understanding of the common ways in which finite elements may fail to find a valid solution, and familiarize the student with how a commercial finite element code works.

Strength of Materials

Academic hours: 70

The objective of the course is to prepare students to learn and solve problems in solid mechanics, and to prepare them for advanced studies in structural analysis and design. The students are expected to be able to analyze both statically determinate and indeterminate problems involving axial, torsional, and flexural deformations. Successful completion of this course will prepare students for further study in structural analysis and design.

INDUSTRIAL

Introduction to Marketing

Academic hours: 42

This course covers specific aspects that put Marketing at the leading edge of the modern firm's activities: understanding customer's needs and designing a comprehensive approach aiming to fulfill these special needs. The students will be exposed to the basic principles, perspectives, concepts, theories and models that have been crystallized into the contemporary science of Marketing.

Introduction to Economics for Engineers

Academic hours: 28

The course introduces students to the basic concepts of microeconomics, such as scarcity and choice of factors of production, decisions of producers and consumers in competitive and monopolistic markets and governmental intervention in these markets. In addition, the course provides some basic tools for economic feasibility analysis. The course includes the following topics: Factors of Production and Production Possibilities Curve, Costs of Production and Producer's Supply Function, Demand and Equilibrium in Competitive Markets, Monopoly, Government Intervention in Competitive Markets.

Human Resource Management

Academic hours: 30

The course will provide the knowledge and practical tools necessary for proper management of the human work force within an organization: planning, recruitment, staffing, performance evaluation systems, career development and work relations

Managing and Initiating in High Technology Firms

Academic hours: 28

With the acceleration of technological development and increased global competition, many firms discover that the main way to create and maintain a sustainable competitive advantage is by innovation. The management of technology, innovation and Intrapreneurship within established firms is a new academic discipline, which has emerged in recent years and includes management tools and models. This course deals with the various aspects of initiating and implementing innovation in established high-tech firms: strategic, functional, organizational and behavioral. The course presents theoretical models along with practical case studies. This course aims to equip participants with state of the art methods and tools to: 1. Discover customers unmet needs through "Jobs to be done Thinking®" and more specifically applying outcome driven innovation methodology, and 2. How to transform an established firm Business model for renewed growth.

Seminar in Automata

Academic hours: 26

In this seminar we will first review the basics of automata theory and formal languages. We will then describe the Chomsky grammar hierarchy and introduce various advanced topics such as ; automata on infinite words, automata on trees, automata and game theory, automata and learning theory. The students will choose a topic from a given list, read relevant papers and give a presentation on the topic.

Accelerating Firms through Business Model Transformation

Academic hours: 28

Growth is a critical factor for any company; yet, it is an elusive target as most firms hit a growth plateau. Numerous successful companies stumbled disastrously when they tried to peruse opportunities for growth (McGrath and Macmillan, 2009). This course aims to equip students with state-of-the-art methods and tools to accelerate an established firm's growth through business model transformation (BMT). In particular the following topics will be learned: Why most firms reach a "Growth Setback" stage; How to transform an established firm business model for renewed Growth; How to create a business model portfolio as a mean for renewing a firm growth; How to discover customers unmet needs in established markets.

Cross-Cultural Management

Academic hours: 42

The globalization process in today's world has created cross-cultural interactions and revealed the similarity and differences between cultures. The purpose of this course is to provide knowledge and understanding of the impact of culture on management practice. Specifically, we will evaluate the effect of culture on teams' behaviors; communication, human resource management practices; leadership and negotiation, and we will examine how to adapt proper managerial practices in different cultural setting. At the end of the course the student will: 1. Develop an awareness to cultural difference in international environment; 2. be familiar with cultural characteristics of different countries and different work settings; 3. be familiar with different managerial practices and their adaptation to the different cultural environments.

BIOTECHNOLOGY

Immunology

Academic hours: 28

The fundamentals of Immunology are taught with attention to the singular scientific approach and conceptual development of this relatively new but essential discipline. The introductory course provides students with the knowledge and the intellectual tools to understand immunology today and the challenges of Immunology in the future.

Bioinformatics

Academic hours: 28

Life sciences have become, in many aspects, information technology. The exponential growth of biological data covers all areas of Biology and Biotechnology – from DNA, RNA and protein sequences via comprehensive data on interactions between biomolecules to structures. The course aim is to teach the main concepts of computational visualization, analysis and prediction of sequence and structural biological data with a specific focus on proteins. The course will focus on presenting

the field of bioinformatics tools and analysis in an applicative manner. As such, the course will include numerous topics studied at a level sufficient to apply the studied tools on new sequence and structural data of interest.

Advanced Technologies in Tissue Engineering

Academic hours: 42

Tissue engineering is a key method in the practical aspects of regenerative medicine. Due to the importance of the field, it is important to expose students to existing advanced technologies. The course deals with practical aspects of culturing and monitoring animal cells, by using advanced tissue engineering methods. The course focuses on hands-on practice. The students will be exposed to common laboratory work: medium preparation and change, cells splitting and routine culture of cell lines in the lab.

During the laboratory work, students will practice tissue formation (cell differentiation) by using different types of cells seeded on various scaffolds\hydrogels: Alginate, Matrigel matrix™ and a unique GAG mimetic hydrogel. Cultured cells features will be examined by morphology and by Immunostaining using specific cells markers.

ELECTRONICS

Introduction to Control

Academic hours: 70

The subject matter of this course encompasses the fundamental principles and relevant techniques for designing continuous-time SISO LTI control systems that satisfy practically relevant system performance specifications. Topics of the course are: introduction and foundations, Feedback control fundamentals, Loop transfer function fundamentals, Linear SISO systems, and tracking design with uncertain plants. Expected outcome of the course: The student is able to design continuous-time SISO LTI control systems that satisfy practically relevant system performance specifications in frequency domain.

Signals and Systems

Academic hours: 42

An engineer has to have a set of mathematical tools for analysis and design of systems. Systems operate on and produce signals. Therefore both are treated together in this course. The material is organized as follows: Signals (functions of time mostly); systems; differential equations with constant coefficients; LTI state equations; application of Laplace transform; feedback loops; review of fourier series; application of fourier transform.

Image Processing

Academic hours: 84

Basic properties of the human visual system. Pixel. Computer presentation of the Gray and RGB images as arrays. Creating a set of synthetic test images by using C and C++. Contrast and Brightness. Pixel-to-Pixel operations: Contrast stretch, Automatic Min-Max contrast stretch, Histogram Equalization. Usage of LUT and pointers for fast implementation of pixel-to-pixel operations. Geometrical Transformations: scaling, rotation, affine Transform. Image registration. Median filtration. Filtration by convolution. Gaussian filter. Usage of FFT for Image Processing. Unsharp Masking. Edge detectors. Usage of MATLAB for fast prototyping Image Processing systems. Design and properties of digital camera. In the frames of the course, laboratory, students implement a selection of the Image Processing algorithms by using Visual Studio (C, C++, C#, .NET).

Micro-Processors

Academic hours: 84

This course provides an introduction to micro-processor based systems, inside architecture of 16 bit processor (Intel 8086). ■ Principles of micro-processor programming in Machine Code, Assembly 8086 language and Modular programming. Principle operation of RISC and CISC processors. ■ Programing for Windows OS, based on DLL files ■ Advanced architecture of modern processors "Intel 32bit", Pentium4- dual core, Pentium – pro and inside architecture of "Intel 64", Itanium. ■ Fundamentals of development of a micro-processor based system, Pentium- Main Memory Organization, Virtual Memory, Paging Mechanism, Cache Memory Organization. ■ Principles of serial communication, RS-232, USB. ■ Detailed studies of computer I/O and interrupt techniques, timers, parallel and serial interfaces. ■ Laboratory activities provide the student with experience in developing the hardware and software required to incorporate microprocessors into systems in ASM86 language. ■ PC peripherals including - keyboard, screen, drives, serial port and mouse.

Real Time Digital Signals Processing

Academic hours: 42

Basic analog and digital signals. Examples of medical signals (ECG, EEG, EMG, ERG, PPG). "Arduino Due" board as software defined signal generator controlled by UART command. "EasyStart Kit - PIC32MX7" board as fast prototype board for RT-DSP algorithms test. Practical aspects of the signal' acquisition by using ADC: pre-amplifiers, anti-aliasing filters, usage of timers and interrupts. Usage of TFT screen to present graphs of the signals and textual information. Basic DSP algorithms and their practical implementation: filtration by convolution and by using FFT, normalized correlation, autocorrelation, median filtration. In the frames of the course "Arduino Due" board and "EasyStart Kit - PIC32MX7" board are used to create working prototypes of RT-DSP systems: "Spectrum Analyzer", "Medical signals smart monitor", "Filtration of audio signals" and others.

Analog Integrated Circuits Design Lab

Academic hours: 84

Analog CMOS integrated circuits design focuses on the basic building blocks including current source/mirror, single stage amplifiers, differential stage amplifier. The lab experiments involve hands-on design using state of the art CAD tools. Lectures complement the experiments providing theoretical background. The course follows the design cycle: from specification definitions, through architecture selection and basic design, to fine-tuning providing precise simulations. Simulation employing CAD tools of performance parameters such as gain, frequency response, stability, voltage span, operating point, slew rate and offset. To summarize the course, the students will be given independent design tasks (mini-projects) to implement the techniques studied.

MATHEMATICS

Approximation Theory

Academic hours: 42

The course focuses on the approximation of real-valued continuous functions by some simpler class of functions, such as algebraic polynomials. Some of the topics that will be investigated are: ■ Chebyshev polynomials ■ Least square problems ■ Projection methods ■ Interpolation (for example: Lagrange, Chebyshev, Hermite) ■ Remez's algorithm ■ Padé approximant. The above and more related topics will be practiced Chebfun (an open-source package for computing).

GENERAL

Water/Waste Cycle

Academic hours: 28

This course takes you on a journey to explore the exciting triangle of environment, water and energy in our emerging world. Lectures combined with field visits to institutions that practice these issues focus on: water management, water resources, desalination, wastewater treatment and reuse, and bio-energy production from waste, in Israel. Through field trips to various water treatment sites, the students are exposed to solutions for a better future.

Ecological Engineering in Daily Lives

Academic hours: 28

The topic of the course:

1. Utilization of engineering knowledge in daily life, with focus on ecological doing in private lives.
2. Introduction of ecological devices encountered in daily lives.
3. Understanding the engineering principles of ecological devices encountered in the home environment.

Among the introduced devices: Desert coolers, geothermal cooling, photovoltaic panels, natural building, greywater systems.

Ethics of the Fathers

Academic hours: 28

Ethics of the Fathers or in Hebrew: "Pirkei Avos", literally Chapters of Our Fathers, is a section of the Mishna, one of the most fundamental works of Jewish Oral Law. The Mishna was authored in the third century C.E., and discusses laws and customs of virtually all areas of Judaism, ranging from holidays, dietary laws, Temple service, marriage and divorce, and civil law. It records opinions of scholars from the five centuries preceding the Mishna's writing. Pirkei Avos is the only section, or tractate, of the Mishna which is devoted exclusively to the ethical and moral statements of the Sages. For this reason, it is usually referred to in English as Ethics of Our Fathers. The tractate consists of six chapters.

Myths and Legends

Academic hours: 28

In this course we will explore a selection of myths and legends in text and film format. The course will discuss the development of these works over time and will consider the manner in which different cultural and critical approaches have been applied to them. We will discuss a variety of topics including: Greek and Egyptian myth (Perseus and Medusa, Osiris and Set), English legends (Robin Hood, King Arthur), historical legends (Cleopatra, Spartacus, Jack the Ripper), movie mythologies (Star Wars, Stargate, Lost), Western myths (Atlantis, The Philosopher's Stone), and mythical creatures (Loch Ness Monster, Jersey Devil, Golem, Vampires and Werewolves, Yeti).

Ethics in Science and Engineering

Academic hours: 28

Engineers and technologists encounter ethical challenges and answer to several ethical codes on a daily basis and through all the professional stages of their career. Moreover the products and artifacts they produce have an ethical effect on the users of such articles as well as on societal moral perspectives and agreements. One purpose of this class is to study through readings (in ethical theories as well as technological reports) and discussions the basic ethical principles of engineering and the main ethical obligations and challenges that face the professional through his work in a technological industrious environment. In addition, the impact of technological artifacts on societal and personal moral and ethical perspectives and behaviors will be debated based on former examples. At the last part of the class, Students will be asked to evaluate the ethical putative outcomes of advanced and innovative technologies based on their current academic stage and former insights from the class and argue for fair ethical solution for such moral challenge. Through the course student will discuss issues of accountability, responsibility sharing, obligations, risk assessment, trust, fair access, privacy by design and ethics by design etc.

Study in Selected Advanced Israeli Industries

Academic hours: 56

This course introduces students to leading industries in Israel, stressing industries unique to the country, and those that are especially developed here. The course will cover technology, manufacturing, engineering practices and business considerations, and will include field trips to relevant plants.

Advancing Global Health Through Engineering

Academic hours: 28

This course is open to students of electrical, mechanical, software, biomedical and industrial engineering, and is designed to provide them with platforms to develop skills in interdisciplinary teamwork, lateral thinking, problem-solving, and communication with each other, health personnel, and with the community. Thus, class discussion and work in the community form an essential part of learning and assessment on the course. In addition, students are encouraged to take a broad world view in terms of the benefits to communities of functioning and well-maintained engineering projects (the bigger picture for sustainable projects) while at the same time honing memory skills and the attention to detail necessary in all engineering tasks.

Sustainable Development and Technology in Industry

Academic hours: 28

The course will present various aspects of the green building principles, and systems, and their implementation in practice. The main purpose of this course is to develop the skills and knowledge in sustainable aspects, and to develop the awareness of students to green systems in engineering and industry, such as in: software engineering, electricity and electronics, civil engineering, biotechnology and mechanical engineering. The course will provide a hands-on learning experience enabling students to apply fundamental and theoretical knowledge to real world situations.

Basic Hebrew

Academic hours: 56

Tuition: $350

An introductory course in Hebrew for foreign students, focused on speaking and elementary communication skills.

Sports

Academic hours: 2

Tennis, basketball, table tennis, aerobics, karate, pilatis, yoga, kick-boxing, feldenkrais, chess, spinning, gym.

Beyond the Classroom

HOUSING

In Jerusalem, students live in the modern Scopus Student Village, adjacent to the Hebrew University's Mt. Scopus campus. Each student receives a private air-conditioned bedroom in a suite with four other bedrooms, a living room, kitchen and bathroom facilities. Reasonably-priced meals and snacks may be purchased on campus or nearby.

Braude's dormitories are modern, spacious, comfortable and equipped with a kitchen. Study abroad students live alongside Israeli students. The cafeterias offer reasonably priced meals throughout the day.

HEALTH INSURANCE

The Hebrew University and Braude College purchase health insurance coverage for students who participate in the Study Abroad Program.

SECURITY

The safety and security of the students is taken very seriously. All students receive a comprehensive security orientation upon their arrival. At both the Hebrew University and Braude, guards and security teams are on duty around the clock. All student activities, on and off campus, meet the strictest security requirements.

LEARNING FACILITIES

On both campuses, learning facilities are spacious and comfortable and equipped with today's most advanced technology. Computerized libraries, up-to-date laboratories and computer labs are available, and WiFi access is widely available.

SPORTS

The Lerner Family Indoor Sports Complex, located near the Scopus Student Village, includes a semi-Olympic swimming pool, sauna, gym, weight room, spinning studio and aerobic fitness center. Adjacent to the complex are ten tennis courts. Monthly memberships beyond the classroom can be purchased at a discounted rate. Braude's modern sports facilities include a gym that features aerobic and weight-training machines, as well as tennis, basketball, volleyball courts, and a near-by swimming pool. Use of the sport facilities is free.

FOOD on and off the campus

During the academic program in Israel, students will be staying in the dormitories, sharing living space with fellow students. Every dormitory unit has a kitchen, which is equipped with a refrigerator, a hot plate for cooking, and other kitchen accessories.

During week days there are several food services available for students on campus – vegetarian and meat based. On Saturdays, the food services are closed.

For the students' convenience, we have provided the following price list of common food products that you may want to buy while living in the dormitories. As you might expect, the prices vary somewhat from store to store, and the lowest prices can be typically found in outdoor markets. Prices in supermarkets may be higher. The table below lists price ranges of typical products.

Eating habits are personal, and every student manages their food consumption individually. However, from experience, we have noticed that students who used the kitchen in the dormitory unit during the study abroad program for cooking, spent between 220-280 USD per month for food.

The information here is presented to help students to budget their financial resources during the study abroad program in Israel. Students who are planning to travel in Israel during the program, should consult with internet sites and experienced travelers in Israel, to gauge the cost of travelling in Israel.

Products:	$	Products:	$
Milk (3% fat), (1 liter)	1.2-1.7	Apples (1kg)	1.5-2.6
Loaf of Fresh Bread (500g)	1.1-1.9	Bananas (1kg)	1.2-1.8
Rice (white), (1kg)	1.7-2.3	Oranges (1kg)	0.8-1.5
Eggs (regular) (12)	3.0-3.7	Tomatoes (1kg)	0.7-1.4
Local Cheese (1kg)	6.2-9.9	Potatoes (1kg)	0.4- 0.9
Chicken Breasts (1kg)	5.5-8.8	Onions (1kg)	0.5-0.8
Beef Round (1kg)	10.5-16.8	Lettuce (1 head)	0.8-1.4

How to get to Braude College?

Enter Israel

The best way to get to Israel is by air. The international airport of Israel is Ben-Gurion airport

Bus Service

Detailed information on travel times and service frequencies on various bus lines can be obtained from the **Transport Lines in Israel Portal.**

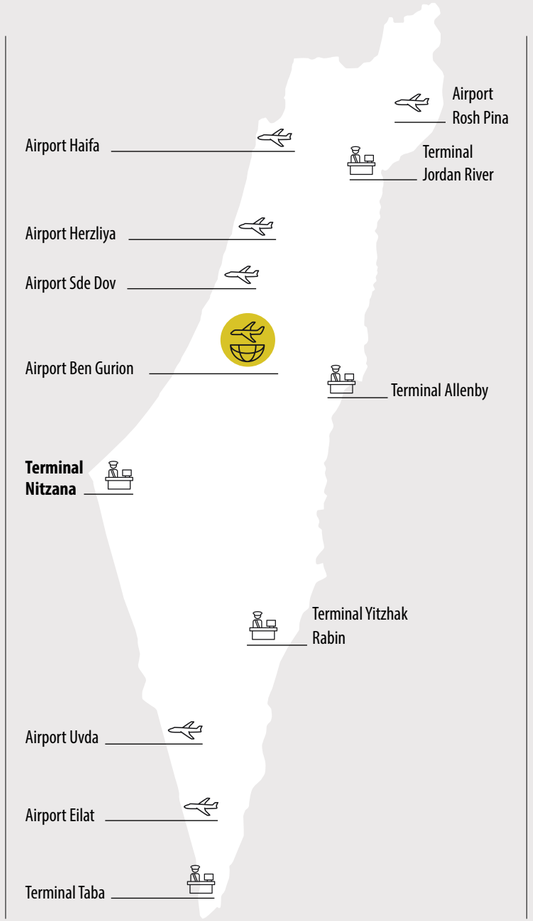
Train Service:

Information regarding the timetable and routes is available through Israel Railways information:

Tel.: *5770 or 03-5774000
as well as on the **Israel Railways website**.

Israel Railways operates a "Park and Ride" service, which enables its passengers to park their vehicle at Ben Gurion Airport at a special rate of nis 15 per day. The service is limited to one day only. Users of the "Park and Ride" service may use the Short-Term Parking only. To exit the car park without payment, keep the train ticket and the parking card issued upon entering the car park.

Payment for parking is made at the automatic pay machines located in the car park.



Application

For further assistance, contact the RIS student affairs representative in the relevant country:

UNITED STATES:

hebrewu@hebrewu.com

1 800 404 8622 or 1 212 607 8520

CANADA:

admissions@cfhu.org

1 888 HEBREWU or 1 416 485 8000

UNITED KINGDOM:

students@bfhu.org

020 8349 5757

ISRAEL AND OTHER COUNTRIES:

rissummer@savion.huji.ac.il

972 2 5881610 or 972 2 5882602

Printed in Israel, Artplus, 2018

Design: Liat Yehuda Studio **Photos:** Tal Nisim, Shutterstock: Protasov AN, Evgeny Beloshabsky, Jose HERNANDEZ Camera 51's; Ministry of Tourism (www.goisrael.com); courtesy of the Hebrew University and the Braude College Photo Archives

Programs

All candidates pay a non-refundable application fee of US $80.

MINI-SEMESTER (Part 1 in Jerusalem)
Program Dates: **3.3 – 20.3.2019**

SPRING SEMESTER (Part 2 in Karmiel)
Program Dates: **20.3 – 2.7.2019**

Cost: Housing+study trips: US $5,490

Health Insurance coverage is included.

For administrative information regarding the engineering program contact:

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liats@braude.ac.il
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ROTHBERG
INTERNATIONAL
SCHOOL

THE HEBREW
UNIVERSITY
OF JERUSALEM

Braude College