HIGH-TECH JERUSALEM

CELEBRATING 100 YEARS OF THE HEBREW UNIVERSITY OF JERUSALEM
The Start-up Behind the Start-up Nation

With more than 5,000 start-ups and 350 centers of research and development, Israel is a global high-tech powerhouse that produces the most start-ups per capita in the world.

The Hebrew University is the engine that powers entrepreneurship and innovation in Jerusalem and across the nation. Connecting government, academia and industry, the University drives what Time magazine calls “a flourishing center for biomed, cleantech, internet/mobile startups, accelerators, investors and supporting service providers.”

In 2018 alone, Reuters ranked the Hebrew University among the world’s Top 100 Most Innovative Universities, and Pitchbook ranked the Hebrew University among the world’s top 50 universities producing venture capital-backed entrepreneurs.

As Israel’s technology ecosystem matures, the Hebrew University will play an increased role in its continued development. An investment in the Hebrew University — the start-up behind the Start-up Nation — is an investment in Israel’s future.

“Jerusalem has become a flourishing center for biomed, cleantech, Internet/mobile startups, accelerators, investors and supporting service providers. The ancient city today is not just rich in history, but is full of promise and creativity for the future.”

TIME MAGAZINE
Leading the Quantum Revolution

Quantum information research is one of the hottest areas in 21st century science, promising dramatic improvements in computation speed and secure communication. Based on the inherent wave-like nature of matter and light, it will lead to massive leaps forward in our ability to fabricate, control, measure and understand advanced structures.

The Hebrew University’s Quantum Information Science Center is Israel’s leading center for quantum information research and development. With nearly 30 researchers specializing in physics, computer science, mathematics, chemistry, philosophy and engineering, the Center is at the forefront of a new global revolution in the way we think about the world and interact with nature. It is based on the deep understanding that information (in quantum form) is at the heart of our reality, and this has far-reaching scientific and technological ramifications.

In order to propel these achievements forward, the Center needs:

- State-of-the-art equipment and facilities
- Seed research funding for collaborative projects
- Scholarships for outstanding students

In 2017, the Government of Israel chose the Hebrew University’s Quantum Information Science Center to lead a five-year project to develop a national quantum communications system. Working with industry partners, the Center is developing equipment and expertise to prevent eavesdropping, protect data privacy and secure national infrastructure.

The Center and its researchers are changing the world through groundbreaking spin-off companies such as:

- N.V.I.S.I.O.N. – using quantum sending to enhance medical imaging
- Olight – designing quantum materials for use in displays and efficient light sources
- QuantLR – using quantum communications to protect the world’s most sensitive data
Nanoscience & Nanotechnology

SHAPING THE WORLD AT THE ATOMIC SCALE

At the Hebrew University’s Nano Center, scientists study matter at the nanometer scale and engineer new materials and nano-devices to provide solutions for humanity’s challenges. Merging disciplines including physics, chemistry, engineering, biology, and medicine, the Center’s researchers are developing advanced smart materials and devices for use in alternative energy sources, new light sources, communication technologies, novel drug delivery schemes and much more.

A world leader in nano research and development, Hebrew University’s Harvey M. Krueger Family Center for Nanoscience and Nanotechnology brings together 88 research groups of scientific and technological excellence from across 5 faculties. Supporting academia and industry through educational programs, scholarship and conferences, it serves as an R&D hub for PhD students, postdocs and scientists from across Israel to develop new and exciting applications in medicine, the environment and manufacturing.

Nanoscience research at the Hebrew University includes:

- Nanomaterials for industrial and medical applications, such as Valentis — combining cellulose nanocrystals with nanoparticles to create new compounds for industry
- Nano-optronics for sensing and communication applications, such as TriEye — solving visibility challenges for driver-assisted vehicles
- Nanomedical and solar energy applications

To continue to lead in nanoscience and technology, investment is needed in sophisticated equipment, scientists and engineers, and for scholarships.
The NEQST Big Thing
A SHARED HOME FOR QUANTUM AND NANO

Quantum information and nanoscience are related fields that share many faculty and rely on each other for both research and development. To leverage the potential synergy and to provide cutting-edge infrastructure to each, the Hebrew University has embarked on a bold initiative to create a new home for the Quantum Information Science Center together with the Harvey M. Krueger Family Center for Nanoscience and Nanotechnology.

The NEQST (NanoscalE Quantum Science & Technology) Innovation Hub will bring together experts in nano and quantum science and provide a state-of-the-art shared home for their laboratories and equipment. Researchers will be supported by a dedicated team providing first rate scientific capabilities enabling pioneering research in nanoelectronics, nanophotonics and 3D printing of novel materials and devices.

Co-locating the two Centers in a shared space will make possible new and unprecedented levels of innovation, by allowing scientists from both fields to collaborate and leverage each other’s know-how. The resulting synergies will support and increase the Hebrew University’s leadership in both quantum and nano technology innovation.

Nano and quantum science are distinct disciplines, with powerful overlap between them. At the nano-scale quantum effects become manifest. In parallel, nano fabrication tools are the only way to build and control new quantum systems. The information processing and sensitivity of quantum systems can only be unleashed with the tools of nanoscience.
Fueling the High-Tech Ecosystem in Israel

COMPUTER SCIENCE AND ENGINEERING

Mobileye powers computer-assisted driving. BriefCam transforms video into actionable intelligence. The Federmann Cyber Security Research Center proposes solutions to vulnerabilities in computer networks, and the CASMIP Lab develops solutions for computer aided surgery. From its research centers to numerous spin-off companies, the Rachel and Selim Benin School of Computer Science and Engineering is making a difference.

Israel’s high-tech sector is hungry for qualified computer experts with the booming technology industries in Israel requiring an estimated 10,000 new graduates each year beyond those already working in the field. To meet this need, the Hebrew University has nearly doubled its intake of new students in this field, making computer science the University’s fastest growing academic unit.

The School also collaborates with companies like Google, Intel and Microsoft through its Industrial Affiliates Program, to strengthen the bonds between high-tech and Jerusalem. However, in order to meet the growing demand for qualified tech personnel, the School must continue to expand.

By 2025, the Rachel and Selim Benin School of Computer Science and Engineering expects to have 2,000 students in its undergraduate programs, turning it into the largest producer of high-tech talent in Israel. Additional funding will allow the School to reach growth targets for the next five years:

- Recruiting new faculty members
- Providing scholarships to graduate students who are needed as teaching assistants
- Employing more junior teaching staff
- Building a new facility to accommodate the increased numbers of students and academic staff.

The Artificial Intelligence, Machine Learning, and Computer Vision labs, in the School of Computer Science and Engineering, are internationally acclaimed for their diverse research activities and applications to real-world problems. For over 30 years the School’s renowned computer scientists have made innovations in areas such as computational neuroscience, computer vision, genetics and molecular biology, security and video surveillance, and computational economics.

Computer science doctoral students at the Hebrew University recently demonstrated mathematically that algorithms based on deep neural networks can be applied to better understand the world of quantum physics, which has the potential to revolutionize all aspects of our lives. Their study was published in Physical Review Letters.

The Israeli tech ecosystem simply cannot support the increasing demand for tech talent primed with the necessary AI know-how. As companies announce ambitious recruitment plans, heads of Israeli academia warn of an acute shortage in human resources.
HUJI Innovate—encouraging innovation across the university

HUJI Innovate—the Center for Innovation and Entrepreneurship—is a platform for infusing entrepreneurial values and skills into the lives of students and researchers. Through workshops, academic courses, meetings with industry leaders, and events, HUJI Innovate delivers the practical knowledge and hands-on experience to transform ideas into ventures and bring them to market.

HUJI Innovate is a partnership between Yissum, the Faculty of Science, and the Jerusalem Business School. HUJI Innovate fosters collaborations with government, industry, schools, and Jerusalem’s high-tech and business communities, and recently won a competitive grant from the Israeli Council of Higher Education to establish an innovation and entrepreneurship ecosystem in Jerusalem, in partnership with the Bezalel Academy of Design and Azrieli College of Engineering.

In this century, whether you work in tech or in services, you need to be an innovator and entrepreneur. Our vision is that every student, from semester one, will learn about innovation.

Dr. Amnon Dekel, Executive Director, HUJI Innovate

Educational programs include:
- Venture Creation Studios in various verticals (Agri and Food Tech, Digital Services, BioTech, EdTech and Social Ventures) that teach HUJI students and alumni how to go from idea to venture using the Lean Startup Methodology.
- A startup accelerator that enables budding entrepreneurs with promising ventures to receive workshops, mentorship and pre-seed funding to jump start their companies.
- Intensive 3-5 day courses that explore disruptive innovation in specific sectors using multi-disciplinary methodologies.
- Courses in which students and faculty learn the basics of programming, prototyping and how to build nearly anything.
- Educational programs that introduce children and youth to innovation and entrepreneurship.
The Teacher-Researcher Program was the brainchild of a group of Science faculty members who were also parents to children in the Jerusalem school system, in response to the shortage of qualified science teachers in Israel, which in coming years is expected to intensify.

To counter this trend, the Hebrew University has partnered with the city of Jerusalem to create this program, which trains PhD graduates to teach high-level science in Jerusalem high schools, while continuing to conduct scientific research as University research fellows.

Through their unique position at the nexus of secondary and higher education, Teacher-Researchers are able to bridge the gap and make science real for students through activities such as visiting the University’s cutting-edge labs. For some schools, Teacher-Researchers can make the difference between having no dedicated science teacher and having a first-rate educator and researcher.

Teacher-Researcher salaries are covered by a three-way partnership between the University, the Jerusalem Municipality and philanthropy.

In its first five years, the program placed 13 Teacher-Researchers in Jerusalem high schools, reaching more than 650 pupils in the last year alone. The University aspires to place 3-5 additional graduates each year until there are a total of 20-25 teacher-researchers in the program. The continued success of this pilot program and its expansion to other universities could be the key to improving science education and achievement in Jerusalem and across Israel.

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PROF. ERAN SHARON, TEACHER-RESEARCHER PROGRAM CO-FOUNDER

“In addition to teaching high-level science and research approaches, the Teacher-Researchers bring the University to schools and schools to the University.”

ADIR, GILO COMPREHENSIVE HIGH SCHOOL STUDENT

What we are learning goes beyond chemistry: to study with an open mind, to research, to become interested, to be curious.

IN THE LAST YEAR ALONE, OVER 650 JERUSALEM PUPILS HAVE LEARNED FROM OUR 13 TEACHER-RESEARCHERS.
While each faculty member has their own lab with personalized instruments, purchased with their specific research in mind, there are also large and expensive pieces of equipment that it is far more efficient to share.

Shared equipment facilities give our scientists access to the most up-to-date equipment for their varied research from neurodegenerative diseases, to plant science and from DNA discovery to cancer research. One such technology is mass spectrometry, a technique for separating isotopes, molecules, and molecular fragments according to their mass in order to identify the chemical constitutions of substances. The Center for Proteomics and Metabolomics, in the Alexander Silberman Institute of Life Sciences, provides comprehensive mass spectrometry services to 39 different groups studying plant and animal life.

Investment in this and other shared equipment across the University, is a valuable investment in multiple researchers, enabling them to efficiently continue their groundbreaking research across a spectrum of subjects.

"My group’s research area is nutrient remobilization in plants. We use Gas Chromatography Mass Spectrometry (GCMS) to analyze the composition of small molecules and check how plants break down compounds from one tissue to be used as building blocks in other tissues. These are easily measured using GCMS, and in the future we will also use the machine to examine the rate in which metabolites are produced and degraded, which is a closer approximation of the actual metabolism of the cell."

"One of our most exciting projects is to use crosslinking coupled with mass spectrometry to study the structures of filaments and proteins in brain tissue. Disruption of these structures is one of the causes of neurodegenerative diseases such as Alzheimer’s. These findings can only be realized through the very high sensitivity of our mass spectrometers and their high-throughput capacities. In another project that uses this shared equipment, we are trying to find how a certain protein is structured with other proteins to exert its toxic effect in the FSHD muscle degeneration disease."
Scholarships play an essential role in encouraging and enabling top students to study at the Hebrew University. They also help provide funding to exceptional masters-level students so they can serve as teaching assistants and pass their knowledge on to the next generation of students.

Thanks to the generous support of donors, the University is able to grant financial scholarships to outstanding graduate-level science students. Knowing in advance that such scholarships are available can make all the difference as students consider their futures in academia and research.

YUVAL TARRAB

Yuval Tarrab has lived in Israel and Texas, served in the IDF intelligence corps, led the Israeli delegation to a Jewish camp in the US, and obtained a bachelor’s of science degree in Chemistry and Cognitive science at the Hebrew University. While studying toward her master’s of science degree, Yuval conducts research under the supervision of Dr. Assaf Friedler at his lab in the Institute of Chemistry. Her research focus is protein-protein interactions of flagella in bacteria, which she hopes could one day lead to a novel class of antibiotics. As a teaching assistant in the Faculty of Science, Yuval teaches Organic Chemistry to medical students and Physical Chemistry to chemistry students. Yuval says her current studies are made possible because of scholarships from the Hebrew University. “I couldn’t succeed in my studies and work in a full-time job at the same time. So these scholarships have been a great help as I study toward my degree and work toward helping solve the problem of resistance to antibiotics.”

Yevgeny Slobodkin

Yevgeny Slobodkin was born in Belarus and immigrated to Israel with his family. He obtained a bachelor of science degree in Physics at the Hebrew University, graduating with honors. Yevgeny is studying toward a master’s of science at the Hebrew University’s Racah Institute of Physics, where he also holds a teaching position as a lab instructor. Yevgeny is a research student in the Rapaport group, which studies Nanophotonics and Quantum Fluids, and the Steinberg group, which studies electronic transport and tunneling in van-der-Waals devices. “My research involves stacking single atomic layers of different materials on top of each other to create devices with novel optical and electronic properties, as well as to answer some open questions in the field of many-body physics.” Yevgeny lives in Jerusalem with his wife, who is pursuing a medical degree. He credits the financial support he receives with making his work possible: “The scholarship helps me devote most of my time to research and allows me to be more productive,” he says.
Brilliant minds are the lifeblood of a university. To remain competitive and push scholarship forward, the Hebrew University must compete on a global scale to attract the best academics — those in Israel, Israelis furthering their research abroad, and international scholars. All such candidates measure the prospect of joining the Hebrew University against competing offers from academia and industry in Israel and abroad.

Recruiting top faculty requires resources: the cost of renovating a lab, buying equipment, and providing start-up funding for a new faculty member can reach well over a million dollars. For the Hebrew University and for Israel, this investment pays huge dividends by keeping top scholars in Israel and creating clusters of scientists who expand the frontiers of knowledge and develop the next generation of Israeli scholars.

- Each year some 50 new researchers join the Hebrew University faculty and about 60% of them are in STEM fields.
- The cost of establishing a new faculty member’s lab can reach well over a million dollars.

The Hebrew University has always been the place where I can learn fascinating things, stimulate my curiosity, and also enjoy. I feel extremely fortunate to have the opportunity to come back as a faculty member, after working as a research scientist at Google in California.

DR. AMIT DANIELY, THE RACHEL AND SELIM BENIN SCHOOL OF COMPUTER SCIENCE AND ENGINEERING

I am so excited to be here and to start our new research group. Hebrew University is a top-notch school with excellent students, with amazing talent and vigor. I can’t wait to engage them in my research.

DR. YONIT HOCHBERG, THE RACAH INSTITUTE OF PHYSICS
In Israel, a land lacking in natural resources, we learned to appreciate our greatest national advantage: our minds. Through creativity and innovation, we transformed barren deserts into flourishing fields and pioneered new frontiers in science and technology.

SHIMON PERES

THE NEQST INNOVATION BUILDING
This new hub for the Hebrew University’s growing nanotechnology and quantum science communities requires support for vital equipment and the highly qualified scientific technicians who operate it, laboratories, research collaborations, and scholarships.

HUJI INNOVATE
The entrepreneurship accelerator for the Hebrew University community requires funding to support accelerators, competitions, courses and programs, and a renovation of its new facility.

SCHOLARSHIPS
MSc Scholarship encourage the best science and computer science students to continue on to graduate studies and to serve as teaching assistants.

TALPIOT IDF LEADERSHIP PROGRAM
A new home is needed for Israel’s prestigious military program in defense R&D.

SCIENTIFIC EQUIPMENT
Research is fueled not only by brilliant minds, but by the sophisticated equipment needed to engage in research and the PhD level technicians who propel it.

COMPUTER SCIENCE & ENGINEERING
Meeting the increasing demand of Israel’s high-tech sector for qualified person-power by expanding the Rachel and Selim Benin School of Computer Science and Engineering. Growth includes an additional physical facility, new faculty members, and scholarships to encourage graduate study.

TEACHER-RESEARCHERS PROGRAM
This out-of-the-box program enables PhD graduates to contribute to science education in Jerusalem’s schools while simultaneously contributing to the advancement of research at the University.

YOUNG FACULTY
Recruitment of top scholars from Israel and abroad ensures that the Hebrew University can continue to make a valuable contribution to Israel and towards advancing science for the benefit of humanity.
An Overview

HIGH-TECH JERUSALEM IN NUMBERS

23,500 STUDENTS
5000+ COURSES
3400+ ONGOING RESEARCH PROJECTS
973 RESEARCHERS
320 ACADEMIC AGREEMENTS WITH INSTITUTIONS IN 44 COUNTRIES

220 POSTDOCTORAL RESEARCHERS FROM 26 COUNTRIES
208 STUDENT EXCHANGE PROGRAMS WITH 36 ACADEMIC INSTITUTIONS IN 24 COUNTRIES
200+ MAJORS AND PROGRAMS
315 ACADEMIC DEPARTMENTS
100+ RESEARCH CENTERS

43% OF ISRAEL’S BIOTECH RESEARCH
30% OF ISRAEL’S SCIENTIFIC ACADEMIC RESEARCH
7 FACULTIES
5 AFFILIATED TEACHING HOSPITALS
14 SCHOOLS
6 CAMPUSES
1/3 OF ALL DOCTORAL CANDIDATES IN ISRAEL

A YEAR OF TECH TRANSFER

NEW PATENTS FILED
SPONSORED RESEARCH & SERVICE COLLABORATIONS
IP LICENSE & OPTION AGREEMENTS
DELEGATIONS HOSTED FROM 29 COUNTRIES
PROPOSALS FUNDED IN NEW EDGES CORPORATE ENGAGEMENT PROGRAM

NEW STARTUPS LAUNCHED
$60M SEED/A ROUND FINANCING
$50M UNDER MANAGEMENT IN THREE SEED VENTURE FUNDS
$7.8M RAISED FOR A NEW SEED VENTURE FUND

AWARDS
1 FIELDS MEDAL IN MATHEMATICS
1 TURING AWARD IN COMPUTER SCIENCE
1 CANADA GARDNER INTERNATIONAL AWARD
8 NOBEL PRIZES
14 WOLF PRIZES
46 EMET PRIZES
100 ROTHCHILD PRIZES
294 ISRAEL PRIZES

FACTLETS

In October 2018 Reuters ranked the Hebrew University among the world’s TOP 100 Most Innovative Universities doing the most to advance science, invent new technologies and power new markets and industries.

The data and investment analyst firm Pitchbook ranked the Hebrew University in the TOP 50 GLOBAL universities producing venture capital backed entrepreneurs.
Harnessing the Power of Jerusalem

Jerusalem has become a world renowned hub for technology and innovation. Leading the way is the Hebrew University, where our faculty and students are conducting groundbreaking research on the cutting edge of science – from nano, quantum, and computer sciences to bioengineering, cyber security and astrophysics. They are making discoveries and creating start-ups that will change our understanding of our world and how we live.

We invite you to partner with us in investing in the research, people and initiatives that are the foundation of High-Tech Jerusalem and of Start-Up Israel – today and into the future.

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