ENGINEERING A BETTER WORLD

sce

המכללה האקדמית להנדסה ע״ש סמי שמעון

sce
SHAMOON COLLEGE OF ENGINEERING

What's in this issue?

A Unique Training Program Offering a Solution for the Severe Shortage of Marine Engineers

The marine engineering field is gaining momentum, however there is a significant shortage of marine engineers in Israel, as very few engineers choose to specialize in this field. Marine engineering is characterized by particularly complex projects in terms of their planning and execution, among them planning seaports, marinas, breakwaters and piers, planning coastal protection, ocean digging projects, artificial islands, desalination facilities and marine infrastructures.

SCE Ashdod has initiated the training of engineers for the marine field who will go on to bring their expertise to industry that is in dire need of qualified personnel. The program aims to train civil engineers interested in specializing in and entering the marine engineering field and contending with a broad range of issues in marine infrastructure projects in large companies such as Israel Ports and the Israel Electric Corporation. As part of the program students receive training needed for receiving a yacht skipper license.

Dr. Uri Kushnir, Head of the Marine Engineering Program at the SCE (in the past head of the Coastal and Marine Engineering Research Institute, and a marine mapping expert): "The need to train engineers with knowledge in marine engineering is critical in order to address the severe shortage of qualified personnel in the field. The increasing growth in the volume of maritime trade and shipping requires enlarging seaports about every two decades. The location of some of the most expensive real estate assets in the country along the shoreline, for example in Arsuf, Apolonia and Beit Yanai, require protecting the coastal cliffs from collapsing due to wave activity. In the near future, a shortage of land along the coast and rising real estate prices will require the development of industrial and residential infrastructures in the ocean and on artificial and/or floating islands. The Prime Minister's Office and the Ministry of Transportation have already set in motion initiatives aimed at examining the feasibility of developing artificial islands, a floating airport, etc. Furthermore, continued water shortage along with population growth requires building additional desalination facilities and planning marine pipelines and infrastructures."

Impressive Award of Research Grants to Members of the Academic Faculty

President of SCE – Professor Jehuda Hadad

SCE academic faculty members continue to strengthen the College's standing in Israel's academic landscape. Only recently two faculty members were awarded significant grants: Prof. Ahmad Salman from the Physics Unit won a grant from the Kamin Program, and Dr. Svetlana Daichman from the Industrial Engineering and Management Department earned a grant from the Center for Innovation in Transportation.

These awards and achievements are in line with the vision of the College and its head, Prof. Jehuda Haddad, to promote excellence in research and teaching while collaborating with industry and with the international scientific community.

We wish the grant recipients continued success in their research.

SCE continues to renew, to develop and to invest - in infrastructures, its teaching faculty, staff, graduates, and above all in you – our students. The Council for Higher Education recently announced that engineering is currently the largest study field in Israeli academic institutions, with engineering students comprising about 20% of all higher education students in Israel.

SCE researchers receive grants and prestigious awards, and the College hosts academic conferences and events about social and environmental topics on a regular basis, that attract researchers, activists and social leaders as well as the general public.

As an academic institution all these and more demand of us to continue to lead in research, in professionalism and in collaboration, based on the understanding that our actions will lead to a better world. And to you, our students and graduates, we must provide a significant initial advantage by preparing you to find your place in industry and academia.

Yours,

Prof. Jehuda Haddad

Engineering Accessibility

Software engineering students developed technological solutions for persons with special needs ● First place: a system for ranking accessible shops

About 100 engineering students took part in the hackathon conducted this week at the SCE Sami Shamoon College of Engineering Be'er Sheva campus, in the aim of finding technological solutions for persons with special needs.

Dr. Hadas Chassidim, who initiated and organized the conference and the hackathon, said that: "The hackathon on the topic of special needs was conducted at the College as part of the Academia Industry Software Quality & Testing (AISTQ) Conference – which promotes relationships between academia and industry. The conference this year, in collaboration with the Be'er Sheva municipality and CDI Negev (Center for Digital Innovation), was dedicated to special needs. To enhance the event additional partners joined in the undertaking – Tech7, the Center for Law and Science, Amram Institute and AlterNet. In addition to the technological challenge that accompanies software hackathons, this year was unique in the need to close professional gaps in the special needs area among engineering students, so that they could define significant problems and develop appropriate solutions. We were glad to find many experts in the treatment, diagnosis, education and legal fields who mobilized to share their extensive knowledge and experience with the participants in their lectures, and many advisors who joined in the course of hackathon to accompany development and improve the process. The hackathon served as an unusual opportunity to expose each and every participant to a complex and challenging world that is an integral part of society, to open their hearts and minds in order to find creative solutions to create a better world that will foster equality, sensitivity to the other and a connection between population groups."

After 24 consecutive hours of work the products were already presented to the judging committee that was comprised of representatives of companies and organizations from industry and academia, and was the entity that announced the winning teams. Committee members included Prof. Gal Meiri from the Soroka Medical Center, Yehuda Marciano - Head of the Be'er-Sheva Municipality's Innovation and Information Systems Department, and Yuval Zana, Senior Director for Technologies and Smart Cities at Digital Israel Headquarters. The students were accompanied by experts from treatment and technological fields, as well as by legal experts on accessibility issues.

First place and a monetary prize of NIS 8,000 were awarded to the Enabled team that was comprised of four 4th year software engineering students from the SCE Ashdod campus: Reuven Bentulila, Benjamin Talpa, Shani Levi and Shiraz Bar. This winning team developed a system that provides information about accessible stores for persons with a disability. The Android application they developed targets accessible stores that can register to the application only after signing an accessibility covenant which verifies that they meet the criteria for an accessible store, and serves the population of persons with a disability and the general public that can use the application to decide whether to visit an accessible store and even to rank a store's accessibility level.

In second place and with a monetary prize of NIS 4,000 was the Planbuddy team that was comprised of software engineering students from the SCE Ashdod campus: Dor Lugasi Gal, Maor Israel, Nadav Avisar, Daniel Morad Saka and Haim Leshem. The students developed an application for managing the daily routine of children on the autistic spectrum. The application is based on the understanding that maintaining a fixed routine that is known in advance is highly important for children with autism.

Prof. Jehuda Haddad, President of SCE: "It is known that engineers should be a significant part of solutions design to meet the needs of the economy and society, needs that change over time. What the students, the future engineers, achieved at the hackathon reflects the change that we see in recent years in the market – engineering for a better world. Hackathons are a learning method through which our students gain experience that prepares them to contend with endless challenges and for the future employment market. The issue of accessibility is also part of the real world that the students will encounter in the future".

The Mayor of Be'er Sheva, Ruvik Danilovich, spoke about the importance of the engineering field to special needs, noting that: "The world presents us with many challenges and to be able to contend with them we are all needed – professionals, software and computer people, highly creative people and more. This hackathon is a wonderful example of collaboration. I thank the College that once again demonstrated that it is an integral part of the community and the city."

How Students from SCE Ashdod Contribute to

Unusual collaboration between Assuta Ashdod Hospital and the Sami Shamoon College of Engineering in the city: six teams of students from the Industrial Engineering and Management department carrying out their final project at Assuta are able to make an impact – to increase and improve the hospital's operational efficiency

No less than six teams whose work is intertwined have one goal – to improve and increase operational efficiency in the various hospital departments, while maintaining the quality of care and service level provided to patients.

For the final project the teams are divided according to the hospital's various responsibility areas, and since each teach focused on a different department they had to consider the activity of the other teams while formulating a system-wide solution for the hospital's operational efficiency. In the course of the project the students identify areas in need of improvement and increased efficiency in the system-wide operation of the hospital, present this to the advisor of the final projects and are able to make a difference. For example, last year the students recommended enlarging the examination rooms in the obstetrics emergency room, basing their argument on engineering calculations. The hospital adopted and implemented their recommendation.

Each of the six student teams conducts a project in a different department, however because their projects are carried out in the same organization they share a common denominator – every team must take into consideration the limitations of the other departments while working together to formulate an efficient system-wide, not only department-specific, solution. This poses a greater challenge for the students – requiring them to synchronize their work and to create synergy between their final projects.

Here is an example that illustrates this challenge – the hospital has a certain number of operating rooms which must be allocated between the different departments based on pre-determined objectives. The students had to examine optimal allocation between the departments based on current needs.

The students must view and analyze the hospital as if it is a production line in a plant, while remembering that ultimately they are dealing with people. The goal is to streamline the activity carried out in the hospital, increasing effectiveness and efficiency while maintaining the desired quality of care and level of service. Ultimately, this relatively new hospital is an organization that designs and implements innovative and modern management approaches.

The students' work can be compared to the service provided by a consulting firm that the hospital commissions to streamline and improve its operation. The consulting firm divides the teams among the different departments, and in the course of their work they must observe and examine things from a systems perspective

Hezi Rosenberg, Systems and Methods Manager at the Ashdod Assuta Hospital: "The mere fact that there is cooperation between the teams means that the students enjoy a new vantage point that they did not have up until then in working on a final project. The current project better simulates real life, and ultimately the students can have an impact. The hospital's slogan: 'A Community that has a Hospital" is not just a slogan – and the collaboration with the Sami Shamoon College is a living example."

Dr. Ofer Barkai, senior lecturer and project

A hospital department at Ashdod Assuta hospital

Ooperating room at the Ashdod Assuta hospital

Increased Efficiency at the Assuta Ashdod Hospital

coordinator in the Industrial Engineering and Management department at SCE Ashdod (the final project advisor): "The SCE acts to contribute to a better world, and as such participates in contending with the challenges of establishing the Assuta Hospital in Ashdod". This is the second year of collaboration between Ashdod Assuta Hospital and the SCE. To date a relationship of synergy and mutual pollination developed between the

organizations. The vision that guided the collaboration with Assuta was to expose the students to the possibilities found in the world of public and private healthcare management."

Lee Levi Eliyahu, 4th year student in the SCE Ashdod Industrial Engineering and Management department and a project participant: We had the honor of conducting projects with the senior management

of Ashdod Assuta Hospital, a public hospital, and to experience the real world of industrial engineering and management. The collaboration initiative between the College and the Hospital significantly contributed to our experience, and I hope that there will be additional collaborations with other entities in industry in the future, and at a similar level. The contribution of exposure to industry is beneficial and more than welcome.

Excellence Awards Ceremony at SCE Ashdod

Scholarships and excellence awards were awarded at the ceremony to outstanding students in the software, civil, mechanical, chemical, industrial and management, and electrical and electronic engineering departments. The ceremony acknowledged two students, members of the Israel Scholarship Education (ISEF) Foundation, who won the President's Excellence Award (having earned the highest grades in their respective departments!), with a grade average of 99 and 98: Amit Malichi who is a mechanical engineering student and volunteers in the Pirchei Academia project, and Avichai Hatav who studies civil engineering and volunteers in the Bridge to Academia project.

The ISEF Foundation and the SCE have collaborated for 25 years in promoting and fostering scientific and academic excellence while accompanying young promising individuals from the periphery in a joint program. Students receive a respectable scholarship, among the highest in Israel, participate in a leadership development program and mentor young people and adolescents in the aim of paving their way to

accessible higher education in the future. On the stage at the outstanding awards ceremony stood five present and future ISEF members: the president of the College, Prof. Jehuda Haddad; the Dean of Students, Moshe Karuchi; ISEF Executive Director - Tomer Samarkandi; head of ISEF South program, Chen Agay; and the two outstanding students – Amit Malichi and Avichai Hatav.

ISEF – Israel Scholarship Education Foundation, acts to narrow gaps in Israeli society by increasing access to higher education and developing social-academic excellence and leadership. The

Foundation was founded in 1977 by the late Edmond J. Safra, Mrs. Lili Safra and Mrs. Weiner, and is among the oldest private scholarship foundations in Israel, that helps promising young people from the periphery, from their undergraduates studies, through Master's and PhD studies to post-doctoral studies abroad.

In the picture, from right to left: Chen Agay Machluf – head of the ISEF South program, the SCE student Amit Malichi, Prof. Jehuda Haddad – SCE President, SCE student Avichai Hatav, Tomer Samarkandi – ISEF Executive Director, Moshe Karuchi – SCE Dean of Students.

Engineering for Patients: SCE Students Develop a Product to Prevent Theft at Soroka Hospital

Three students from the Sami Shamoon College of Engineering along with a team from Soroka Medical Center are working on developing a product they presented and stood out at the Hackathon conducted at the hospital

Interesting cooperation between the Soroka Medical Center and Mechanical Engineering students at the SCE may reduce a particularly painful phenomenon: theft from patients during their hospitalization. This problem was raised by the hospital staff at the hackathon they held last month at Soroka, and three SCE mechanical engineering 4th year students that participated in the event presented two possible solutions to prevent the theft of mobile phones and tablets from hospitalized patients.

The students, Aviv Dadosh, Omer Goder and Yonatan Yaakobi, presented a solution in the form of a small and personal safe that will be attached in a small cabinet to the patient's bed. The students studied the cabinet and the bed and found a suitable place for the safe such that it cannot be removed and stolen. The students also designed a universal product that locks on to the patient's bed and holds a telephone or a table in a locked state, so that the device cannot be removed without a key or the telephone disconnected without a suitable electronic circuit.

The SCE students won second place at the hackathon and the hospital immediately contacted them in order to further the safe project. After meeting with the hospital's Associate Director General and head of Administrative Management, Yarden Nevo, the three students understood where and how they should locate the safe in a protected place in the cabinet, and they are already in the initial prototype development stage. The hospital is interested in first conducting a test trial in one of the departments.

"Before the hackathon began we had a preliminary meeting with the individual who initiated and managed the event, the head of the Neurology department, Prof. Gal Ifargan", the three recounted. "He told us about the limitations of the hospital, about the main difficulties that they and the patients experience, mainly indicating the theft issue – with an emphasis on mobile devices, wallets and tablets that people bring with them when they are hospitalized.

"We began writing a product specification, just like we learned at the College. We took into consideration different elements, such as the shape of the bed, the limitations of the patients and easy patient access. Finally, using software programs we learned in our degree studies we arrived at a product that we presented to the Soroka staff. Following in-depth tests and consulting with the staff we found that the best solution would be to attach the safe in a cabinet next to the patient's bed.

"The hospital's Director General asked us to continue the process with the relevant entities at Soroka, and therefore we met with the hospital's head of Administrative Management. We are heading into exam period at the College now, but in parallel we continue to meet with the hospital staff to advance a real solution for hospitalized patients".

Dr. Gdalya Mazor, head of the Mechanical Engineering department at the SCE noted: "The multi-disciplinary training we impart to our students in the Mechanical Engineering department gives them a significant advantage in planning and developing innovative products. Therefore, I am not surprised that they were selected by Soroka Medical Center management to continue to develop a prototype of the product they designed.

With the support of the College our students participate in numerous competitions and hackathons in Israel and the world on a regular basis. They are always ranked in the first places and are highly esteemed for their creativity and for the level of projects they design".

SCE Pasta Hackathon

The annual competition between SCE 3rd year Civil Engineering students was held this week. The students competed in building a bridge that can withstand various loads using the only raw material permitted – pasta.

The bridges from pasta competition took place this week in the SCE's Civil Engineering department. About one week before the competition the students participated in a hackathon where they planned and built the bridges after receiving the competition instructions and rules, namely - the only material they could use was 500 grams of pasta (one package); only hot glue and thin rope could be used to connect the beams; the bridge must be one meter long, up to 50 cm high with a minimum width of 5 cm.

During the competition the teams placed the structure they had built so that it stood between two surfaces at a distance of one meter from each other. The teams then began to load weights on the bridges to test when they would break and how much weight they could withstand. Despite the extreme conditions many teams succeeded in reaching impressive weights, and the winning team reached a maximum weight of 23 kg. Using pasta as raw material showed the students how various theories could be applied and how different materials react to pressure, gravity, and other natural laws.

"The pasta bridge competition we conducted in the department is part of the College's Project Oriented approach", noted Dr. Dagan Bakun-Mazor, head of the Civil Engineering department. "This method is based on learning by doing in a wide range of classes throughout the students' academic studies. Students gain experience through group work by solving engineering problems encountered in industry, accompanied by close academic and practical guidance that takes into consideration a changing reality. We conduct these competitions to enable our students to gain experience in planning and building tangible products. Thus students better understand the theoretical study material and apply what they learned in class. From conversations with students we see how the material they learned is brought to bear, leads them to think outside their notes and to see things as they take place in the real world. These attributes are a must for every civil engineer, and therefore, beyond the department spirit, these are essential assignments that contribute to the quality of our students".

Developing an Artificial Ovary Using the "Tissue Engineering" Approach

Maintaining women's fertility, mainly of those beginning chemotherapy, is one of the main challenges facing physicians and researchers in the fertility field over the past two decades. Current leading treatments are embryo freezing and egg freezing, treatments that are partially effective but do not provide a solution to young women, mainly girls, who have not started to ovulate. A promising approach entered the clinic in the past decade -

ovary tissue is frozen (the ovary is the female reproductive organ that produces the female productive cells – eggs) and returned to the patient when she is cured from cancer and wants children. However, this method has limited success rates and includes the risk of returning cancerous cells to the patient's body (if the ovary was cancerous prior to treatment). To address these limitations, and parallel to clinical approaches developed in the past decade, an innovative approach developed in the world of "tissue engineering" - in vitro maturation of young ovarian follicles (the follicles are

found in the ovary and contain the egg within them). These follicles, that are in their early maturation stages, are called "primordial follicles" and comprise most of the follicle population in the ovary. Therefore, the potential in the ability to grow these follicles is tremendous.

To date, the main research strategy focused on growing ovarian tissue in a culture or on growing a group of isolated follicles in various hydrogels. In research conducted by Dr. Michal Shachar Goldenberg from the Chemical Engineering department at the Ashdod campus in collaboration with Prof. Smadar Cohen from the Biotechnology Engineering department at Ben Gurion University, conducted with the doctoral student Shani Felder a system was developed for in vitro growth of ovarian follicles which is unique in that it simulates/imitates the natural ovary. This research was recently published in the prestigious journal, Biomaterials. The study hypothesis was that a shared culture of primordial follicles with ovarian

scaffolds, along with biochemical stimuli that exist in a healthy ovary, will stimulate the maturation of the primordial follicles. And indeed, as part of the research a three-dimensional growth system was developed (like a scaffold), comprised of a polysaccharide called an alginate loaded with growth factors (unique proteins that foster maturation of the follicle), with follicles and scaffolds implanted from pig tissue (for the research model). The study initially focused on testing the system in vitro, while the three-dimensional system with all its components was grown in a laboratory incubator for several weeks. Over time the positive effect of the addition of various growth factors and the effect of their concentrations and the type of growth factor on the follicle maturation process was observed. The potential of the three-dimensional system to serve as an artificial ovary was then examined. To do so the alginate scaffolds were implanted (containing growth factors that stimulate follicle maturation, but also with additional growth factors that stimulate the formation of blood vessels following the implantation) in female mice with a depressed immune system whose ovaries were removed (so they could not ovulate). The study findings showed that the "artificial ovary" returned ovulation to the female mice.

Overall, this study lays the foundations for restoration of the ovarian environment for the benefit for follicle maturation, both in vitro and in vivo, employing a simple approach inspired by body functions. In the future it will be possible to continue research in the aim of developing the challenging procedure of growing human primordial follicles, on the path to reaching the overarching goal – a functioning artificial ovary.

Innovation in Building Conference

The Sami Shamoon Engineering College held an Innovation in Building World conference this week. The conference was attended by hundreds of students from the SCE Civil Engineering department, faculty members and representatives of startup companies in the construction field. The conference was conducted in collaboration with CivilEng, the Israeli portal for civil engineering, building and environment.

Many believe that the building field is outmoded and lacks technological progress or the ability to advance in terms of digital-engineering capabilities. The "Innovation in the Building World" Conference held at the SCE this week proves otherwise.

At the conference, the result of collaboration between the SCE Civil Engineering department and the CivilEng portal, startup companies from the building world presented a range of products and technological developments to improve the construction field, shorten building times and protect the lives of workers. Among the range of companies that attended the conference, iMeasure presented a new construction hat with an inbuilt three-dimensional scanner and safety glasses with a smart screen. A broad panel of professionals from the civil engineering field along with engineers from industry shared knowledge and innovations in the developing field.

Ms. Zohar Wolfhart Cohen, CEO of the College, welcomed the students and spoke about their responsibility as engineers: the College strongly believes in the sentence, 'Engineering a Better World'. This is not only a slogan – we train the engineers of the future so they can enter the workforce with professional tools and the ability to better their environment. In addition to professionalism in the engineering world we cannot forget the engineer's social responsibility. Many revolutions, beginning with the industrial revolution, took place to a large extent with the strong involvement of engineers."

Dr. Dagan Bakun-Mazor, head of the Civil Engineering department at the SCE Be'er Sheva campus, noted that: "There is large potential for growth and investment in the building field. The high demand for civil engineering degree studies reflects the building momentum in recent years, and for this reason this sector offers our students employment opportunities. We maintain a continuous relationship with industry and update the curriculum according to changing industry requirements – case in point, two new courses about innovative technologies in construction were recently added to the curriculum. I call on our students to go out into the employment world, to lead new projects and to create real change in the building world".

Integrating MATLAB at the SCE

A range of advanced functions and new developments in MATLAB applications were presented to students and faculty members at a special conference conducted at the Be'er Sheva campus ▪ Hundreds of students and lecturers are already using the software and benefiting from the many options it offers

The SCE purchased an expanded MATLAB software package last summer, an important step in advancing research and enhancing the curriculums in all college departments. Hundreds of students and lecturers have already installed the software on their personal computers, are using the application and enjoying the wide ranging options the MATLAB world has to offer.

In the second semester of the 2018-2019 academic year, and following the decision of the SCE President and the forum of department heads, use of MATLAB was included in eight additional courses. To advance its integration a landing page was created on the SCE website and a MATLAB website was created in Moodle, an excellent self-study platform for students and faculty. Furthermore, lecturers responsible for implementing MATLAB in the department curriculum were designated in every department.

The first conference on MATLAB integration was held last December, and Dr. Elroi Hadad was appointed as the college MATLAB advisor, beginning his work through the MOODLE online platform.

To advance and incentivize use of MATLAB at the SCE, a special conference was held on March 25, 2019 at the Be'er Sheva campus. Advanced functions and new developments in MATLAB applications were presented to the conference participants – students and academic faculty from Be'er Sheva and Ashdod. The conference was organized in cooperation with Systematics which markets the software in Israel, and included two fascinating lectures delivered by Dr. Lorraine Schorr, one of the prominent persons at MathWorks: "The Art of MATLAB" and "What's New in MATLAB". The lectures, in an overflowing auditorium, generated great interest and were - undoubtedly – highly beneficial.

College management views the expanded use of advanced software by both students and lecturers as an important tool in enhancing the skills and abilities of its graduates and in advancing research conducted at the college, and will continue to foster this process.

The Technological Revolution in the Health World: **The Challenge for Engineers**

A study conducted at Stanford University illustrates how technologies from the high-tech field will change the world of health and medicine, while at the same time posing a question mark regarding the feasibility of the practical application of similar technologies for the benefit of the general population.

The Stanford researchers trained an algorithm to diagnose skin cancer through deep learning. The algorithm was trained to detect skin cancer or melanoma by identifying 130,000 images of skin lesions, similar to the preliminary visual diagnosis performed by dermatologists. Stanford's deep learning algorithm was tested against 21 dermatologists who examined the images of the lesions and were asked whether, based on each image "they would proceed with biopsy or treatment, or reassure the patient". The study findings showed that the algorithm matched the performance of the 21 dermatologists in deciding on the best course of action with regard to all the images.

In the U.S. alone more than 5 million individuals a year are diagnosed with skin cancer. The most fatal form of this cancer, melanoma, can be cured if it is detected in its earliest stage and treated properly. Survival rates vary significantly depending on the stage at which the patient was diagnosed, between 15% if detected in its latest stages compared to 65% with early detection. The cost of treating skin cancer to the U.S. healthcare system amounts to USD 8 billion annually. Thus, the significance of early detection of skin cancer is critical for the patient as well as for the healthcare system: treatment of a patient whose complaint is diagnosed by a physician in the early stages is 20 times less expensive than a complaint treated at a late stage.

Suitable training is necessary

The annual Precision Medicine World Conference (PMWC) focused on the question: "How can AI technologies and database analysis technologies be utilized to foster smart, precise and personalized medicine".

There has been significant progress in the use of information technologies from the high-tech field in recent years - to collect and analyze information and for artificial intelligence, alongside pronounced progress in technologies from the biotech world – genetic information sequencing, diagnostic tests and clinical data monitoring. In the near future these developments will enable us to apply tools from the high-tech world, particularly AI, to the health care world – allowing for the development of smarter medicine at the drug development and patient diagnosis stages and in providing personalized treatment.

A significant challenge that may tip the scales in the application of technologies in the health care world has to do with the engineers who will carry this out. At present engineers do not have the necessary knowledge about health care and they lack understanding of the range of needs and considerations. The significance is far-reaching in terms of the market success of a product that is developed, in applying the technology, and above all – in the actual contribution of the product to health care in general and to the patient in particular.

Suitable training of engineers who will have knowledge in the health world will dictate the diffusion rate of technological innovation into this area – in other words when will most of the population be exposed to and enjoy innovative technologies in the health world?

The Chemistry of Love

Dr. Oshra Ilan Sapir, senior lecturer in the Chemical Engineering department, Be'er Sheva campus

Numerous companies throughout the world have offered a new service in recent years - a "professional hugger". For a symbolic sum of several hundred Shekels you can enjoy the most human, pleasant and comforting experience, a hug. The Free Hugs Campaign in Australia offers a free hug to strangers in public places as random acts of kindness, selfless acts just to make others feel better. Free huggers can also be found recently on Nahalat Binyamin street in Tel Aviv. Is this a gimmick? Perhaps it is worthwhile and desirable to adopt this therapeutic method, also free of charge.

Dr. Oshra Ilan Sapir

"A relationship is created if the attraction forces are stronger than the repulsion forces"

When we think about the connection between chemistry and love our automatic thought is that there must be chemistry between people who love each other. In the scientific world the definition of a connection is very simple – "A relationship is created if the attraction forces are stronger than the repulsion forces". This definition also definitely reflects the connection that develops between human beings. In the science world a connection is created between opposite charges, while identical charges repulse each other. Analogously, can we conclude that love can only exist between people who are opposites? The answer is complex. On the one hand we tend to fall in love with people who are similar to us culturally, externally and intellectually. Yet on the other hand we are more attracted to genetically diverse individuals (mainly of the immune system).

The book of Genesis, chapter 2, verse 18 says: "And God said, it is not good that the man should be alone; I will make him a help meet". This verse is very relevant for the electrons in nature that in the absolute majority of cases prefer to configure themselves in pairs, and not surprisingly are called "electron pairs". A condition of an unpaired single electron is considered an unstable "radical" situation, and this electron usually searches hysterically for an electron to pair with. In nature there is no need for a matchmaking television program or for a professional matchmaker, as the electrons will always find a suitable match, sometimes by force. By the way, in the past these unpaired electrons were called free radicals. Indeed, singles have more freedom, which does not prevent them from losing it by pairing. What is special in the context of love and electrons is that electrons can fill the entire space, they are not dependent on time and place, can cross boundaries and sometimes even undergo quantum tunneling. What is this if not love?

Ecclesiastes, Chapter 4 verses 9-10 says: "Two are better than one, because they have a good reward for their toil. For if they fall, the one will lift up his fellow; But woe to him who is alone, for he hath not another to help him up". This sentence summarizes the essence of the creation of the chemical connection. When there is a chemical connection between two single atoms this creates a whole that is bigger than its parts, synergy. This phenomenon is not possible at all temperatures (energy in the environment), and if there are strong differences of opinion due to an unsupportive environment (high external energy) the connection is doomed to fall apart. This sentence is intended for all generations of mother in-laws.

Chemistry? What is it if not love?

Let's return to the comforting hug and to the molecular connection between chemistry and love. Albert Einstein once claimed that the explaining emotions strictly in chemical terms is to take away all its magic. It should be noted that Albert Einstein was a magician when it

came to catchphrases but was not exactly an expert in expressing emotions or love, to which can attest his tormented ex-wife, Mileva Einstein. We can argue about the magic, or its lack, but we cannot argue with the fact that neurochemical processes are involved in attraction or obsessive passion processes, and that they have a molecular basis. In philosophic romantic terms, love is mysterious and veiled in uncertainty. However, from a biochemical perspective neurological activity provides the more accurate description of falling in love.

In the falling in love process we become in effect a private and legal chemical plant of intoxicating (and some times also faulty) drugs, and our body produces, among other things, compounds such as serotonin, dopamine, norepinephrine, phenethylamine, oxytocin and more. Each of these plays an important and significant role in our tendency to fall in love, to create a relationship and to maintain it over time. These substances serve as neurotransmitters (mediating responses to neural stimuli) and/or hormones that determine whether or not there will be "chemistry" between humans. Thus love is a consequence of chemical responses and electrical impulses. I will not go in-depth into chemistry, just a little:

Dopamine plays an important role in emotional arousal, increasing and strengthening feelings of pleasure and satisfaction.
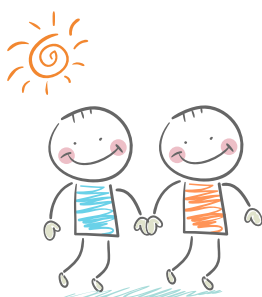
Norepinephrine induces a feeling of obsession and enables us to follow a partner, also with eyes wide shut.

Phenethylamine is an organic compound that arouses and addicts, and simply turns us into addicts of love and full of motivation. By the way, this compound is found in chocolate and yellow cheese, which explains many things.
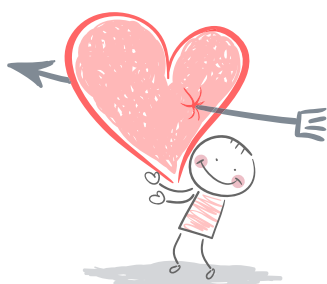
Serotonin causes us to feel wellbeing and happiness about the relationship, and therefore that we must persist in maintaining it, even to the point of endangering our life.
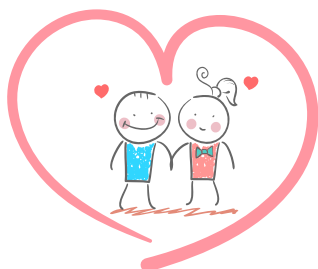
And oxytocin, of course, explicitly called the love hormone, is secreted as a result of touch, caressing and hugging. When secreted it arouses a feeling of ease and security and reduces anxiety. Its positive feedback effect means that its release causes an action which stimulates more of its release, increasing our need to caress and hug and to infuse security in those we love. Thus, the person who claimed that only love brings love was right. Oxytocin causes us to be better, more generous and more empathetic. Studies show that alcohol and oxytocin affect the same receptors in the brain, so that for good reason wine frees inhibitions and strengthens love.

Oxytocin is secreted immediately after childbirth (mainly when the breast is sucked during breastfeeding), which enables the initial 'bonding' between the mother and the newborn. Oxytocin is connected to any type of love, not only sexual love, and this in fact is the reason that we cannot remain indifferent to the cries of cats (cats cry are at a frequency that triggers the release of oxytocin). All these do not lessen the wonderful magic of the connection between people, of long-term commitment and love.

I will end with a quote of one of the psychoanalysts that I love, Carl Gustav Jung: "'The meeting of two personalities is like the contact of two chemical substances: if there is any reaction, both are transformed". This sentence summarizes the uncompromising chemical relationship between love and chemistry from a spiritual and scientific perspective, as there is no real difference between them.

So eat (a lot of chocolate), drink (a lot of wine), and most of all, love.
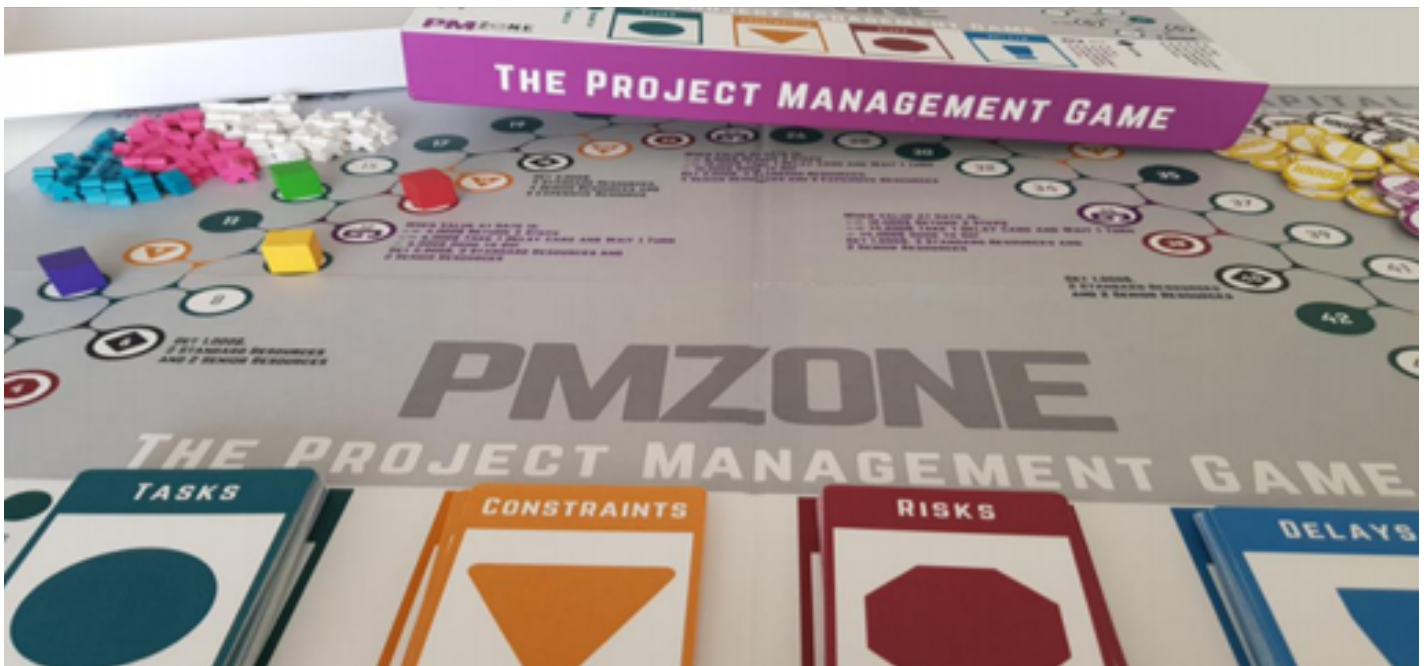
Project Management Smart Board Game Workshop – Ashdod Industrial Engineering and Management Master's Program

Industrial Engineering and Management Master's degree students at the Ashdod campus had an unusual learning experience in March – a 4-hour experiential workshop in the "Project Management under Uncertainty" course. Dr. Ori Orhof, an industrial engineering and management engineer who has managed complex projects for over 20 years brought a project management board game developed by PMZONE Ltd. to the course.

In playing the game the students face common dilemmas from the project management world – through which they develop new vantage points that help them improve the way they contend with professional dilemmas in real life. The workshop uses gamification principles – techniques from the world of game design in order to develop improvements in the non-game worlds.

In the workshop the board game was used to introduce game elements into the learning process, turning learning into an enjoyable, enriching and non-routine experience, while illustrating the study material. The workshop fosters in-depth understanding of fundamental concepts and challenges in project management through an interesting and fun experience.

Engineering A Better World – In Practice

This year the SCE marked the Good Deeds Day as a tradition of helping city residents and volunteering for social-community activities to benefit them. In Be'er Sheva the Student Association volunteered at the Tzavta social club for persons with special needs and in Ashdod the Association volunteered at the Beit Almog Hostel for Persons with Disabilities.

*A huge family happening took place at both college campuses

On Good Deeds Day the SCE opened its doors to the general public with a huge happening that included workshops, organized activities and recreation stations for the entire family. The activities included scientific activities, multimedia games, art workshops, strategic thinking games, scientific experiments and tables with board games. A colorful market was also held during the day to encourage smart ecological consumption, such as exchanging board games, donating clothes and games and more. Players of the Maccabi Ashdod basketball team and the HaPoel Be'er Sheva soccer team participated in the event and met the fans.

Rom Danan, Chairperson of the Be'er Sheva campus Student Association said: "I am happy to have had the honor to take part in the Good Deeds Day tradition in which students and faculty members volunteer in the city. This year we took upon ourselves to renovate the therapeutic garden and building of the Tzavta Club in Be'er Sheva, a center for young people with special needs. We were happy for the opportunity to do good for society and for the community in the city."

Sagi Almakais, Chairperson of the Student Association at the Ashdod campus said: "This year we decided to help people who need us, we looked for something that could do good in line with our abilities. I thank the College for its extensive support of the project, and the Beit Almog hostel for the opportunity to do good deeds for the benefit of the hostel residents."

Gitana Polonsky, the hostel director, thanked the students and the College – "At the outset I thought that they would come and plant some flowers, but I was surprised at the scope of the project and at the students' seriousness. I am sure that the residents will enjoy the beautiful garden they planted. The hostel is their home, and every person wants their home to look nice, just like what the students did here."

SCE Makes the Grade in Workplace League

Four groups honorably represent the College in three different sports – men and women, on indoor or outdoor courts, new and veteran athletes, and even one pensioner - with one thing in common: they all enjoy team building activities and have brought us fine achievements

The Be'er Sheva campus bowling team is on the verge of an outstanding achievement. It completed the 11 regular A-league season games in third place, closely behind the second place which at the end of the season will progress to the national league of the Sport Negev workplace League. The team gained a wonderful balance of 9 victories and only two losses. It also opened the playoff games well, and the fate of the entire season rests on the game against Unilever Arad with which it is competing for the ticket to the national league.

The team captain, Yaarit Katzav, notes that "this is the third year that the relatively veteran team is representing the College and has reached impressive achievements, alongside the team spirit that developed between the team members and between them and members of the other league teams. This combination of honorably representing the College and positive energy had led to successes, and to enjoyment on the way to achieving them".

The Ashdod campus bowling team recently completed the league games in the Ashdod and the Surroundings Workplace League. Out of 9 teams, all with more seniority than our team, the team ended the season in the excellent third place, and with a good season average of 127 points per game.

Team captain Alon Malachi would like to thank the six team members, especially

"Yehuda Mazag, a retiree of the College, who does not miss a game, as well as Ariel Barsheshet, a new player from the Operations Department, who has big shoes to fill, those of Dana Manor, and has demonstrated persistence and excellent results. The season was amazing, and we hope to continue to improve our achievements and to win titles".

The Be'er Sheva campus mini-soccer team is playing its first season in the A3-league that includes skilled and professionally strong teams. One series before the season ends the team holds second place, and a victory in the final series will take it to the championship game against its sworn rival, Rotem – which promises an exhilarating and tense game up until the last minute. League cup games will begin shortly, and the team's goal is clear: to add another

trophy cup to the College trophy cabinet.

Meni Reuven, the team captain, notes that, "The team is skilled and disciplined, with members who for the most part have already played together for 3 years, and have succeeded in making it to the top ranking. This is also the third successive year that we are representing the College at the Sportiada in Eilat, bringing achievements, honor and pride". In closing Meni notes that, "This year the team players also wish to invite the family members of the former player, the late Rami Neeman, in order to memorialize him with their presence".

The Be'er Sheva campus catchball team, comprised of 14 women, began its first season in the workplace league with a strong desire to learn the game, to enjoy and to win. Owing to the team players' determination and learning they proved themselves game after game against veteran and well-trained teams. The team rose to the upper playoff already in its first season, and as noted, from among the 12 teams competing in the league this year it is currently ranked in the respectable 5th place.

Team captain Avia Nuss notes that: "we learned to work together and separately, to make an effort and to improve our individual and group achievements, and the effort paid off. The season will end soon and the team members are looking forward to the beginning of the new season, and with the support of the College they hope to continue to gain numerous achievements, and most important – to enjoy playing together".