



Greetings,

“There’s plenty of room at the bottom,” declared physicist Richard Feynman back in 1959, in after-dinner remarks that became known as the founding “mission statement” of nanotechnology. And indeed, as the scale at which scientists work becomes smaller and smaller, a growing number of students are crowding into nanoscience degree programs.

To meet the challenges of the future, nanotechnology education needs to keep up with developments in the scientific sector. EduNano – an e-learning initiative funded under the European Union’s TEMPUS framework – is an important step in that direction. By modernizing curricula and promoting the mobility of both students and teachers, EduNano harnesses the power of distance learning to democratize the nanotechnology knowledge base, and to provide a variety of learning opportunities for different target audiences.

EduNano’s offerings – geared toward students, teachers and industrial professionals – express the multi-disciplinary nature of nanoscience research. Created through a partnership of eleven academic and industrial institutions from Israel, France, Italy and Bulgaria, and relying on the wide-ranging knowledge of these

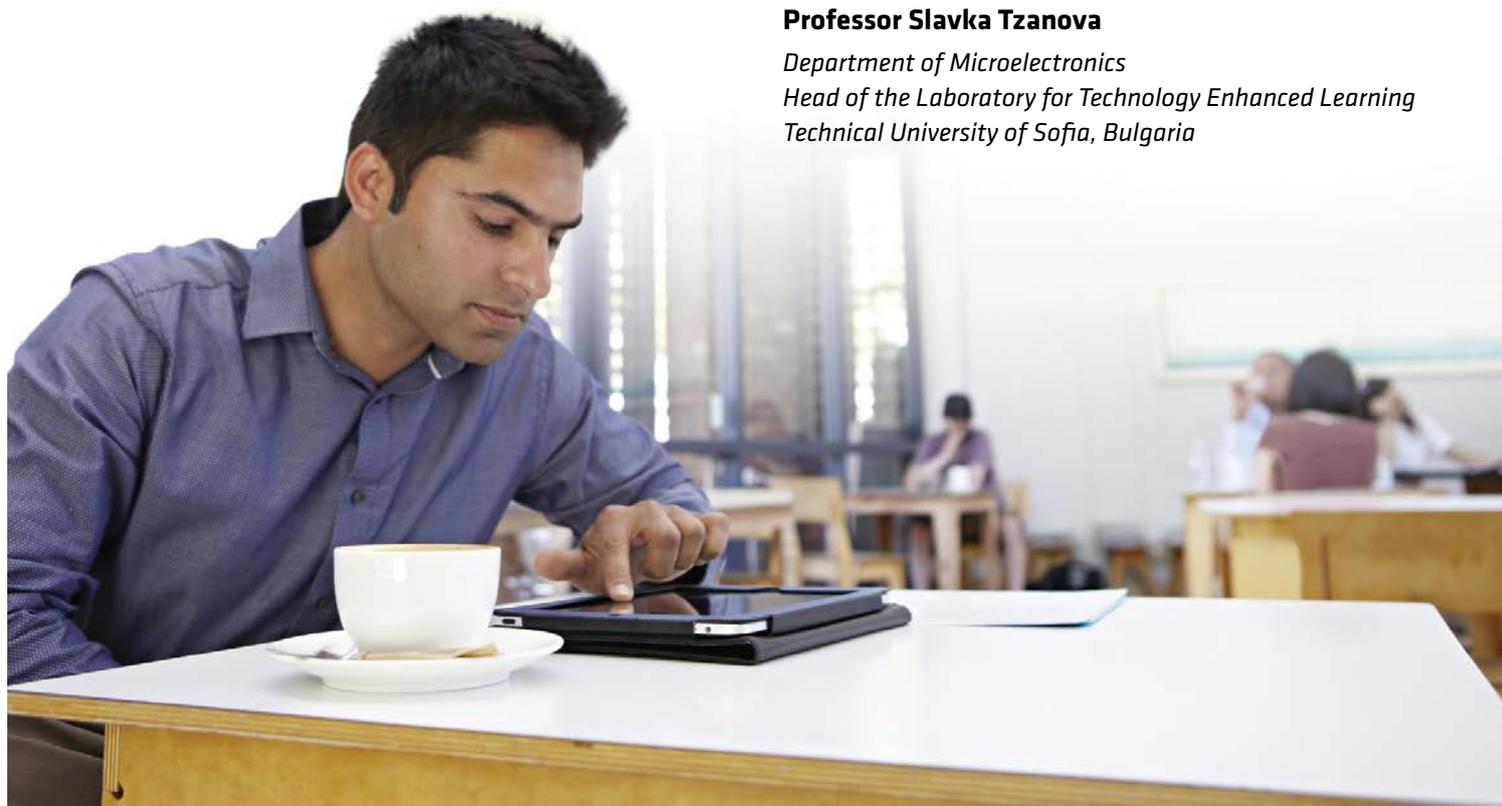


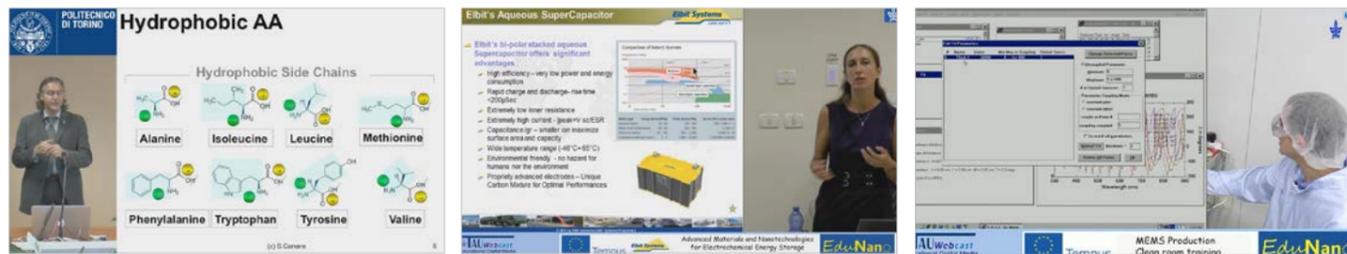
institutions’ academic and technical staff, EduNano covers everything from introductory topics to the latest techniques.

As overall coordinator of EduNano, I am proud to share this newsletter, which provides a look at how this three-year, EU-supported project is progressing. As we move forward, we expect that EduNano will have a profound impact on student achievement and teacher training, and will contribute to the enhanced integration of nano-based advances in industrial markets worldwide.

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Edu-Nano: An International Partnership for Nanoscience E-Learning

Nanoscience experts from Israel, France, Italy and Bulgaria are in the process of preparing and filming online courses for “EduNano” – an international initiative established by the European Union under its TEMPUS framework.

The goal of EduNano is to promote nanotechnology excellence, via distance-learning opportunities that will benefit everyone from high schoolers and their teachers, to university and graduate students, to academic researchers, to technicians and industry professionals. Conceived as a framework for inter-university cooperation, the EduNano consortium includes six Israeli institutions – Bar-Ilan University, Ben Gurion University of the Negev, the Hebrew University of Jerusalem, Tel Aviv University, the Technion, and the Weizmann Institute of Science – as well as Italy’s Politecnico di Torino, the Grenoble Institute of Technology in France, and Bulgaria’s University of Sofia, which serves as the program’s overall coordinator.

Universities are not the only parties participating in the EduNano initiative. Elbit Systems – an Israeli electronics firm – is actively involved, as is the Samuel Neaman Institute for Advanced Studies in Science and Technology.

“EduNano has brought academic and industrial experts together to brainstorm, share their knowledge, and promote a new, interactive conversation for the betterment of society,” says Dr. Ron Blonder, Senior Scientist at the Weizmann Institute’s Department of Science Teaching who is involved in establishing the initiative’s pedagogical approach. “Through TEMPUS,

the EU is expressing its conviction that education is a sound investment – one that will enable tomorrow’s researchers, engineers and technicians to move nanotechnology forward.”

Accessible Learning Matching Industrial Needs

The Samuel Neaman Institute tasked with conducting a needs analysis survey among academic and industry sources to determine the content that would be most useful for the courses’ target audiences, and that would give students the core competencies most relevant to future employment in the field.

Gathering information from senior managers, engineers and technicians working both in Israel and abroad – as well as an international cadre of scientific researchers – the performers of the needs analysis verified that the e-courses proposed by consortium members would do two things: contribute to nano-literacy, and provide high-priority practical skills. The survey also identified knowledge areas that were recommended for increased emphasis, including silicon photonics, nanoparticle engineering and the fundamental principles of the bio-nano interface.

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A Cost-Effective Solution for Nanotech Excellence

While technological advances have made distance learning less expensive than it was just a few years ago, the cost of maintaining a state-of-the-art nanotechnology education infrastructure remains extremely high. This, says Jack Barokas – head of Digital Media team at Tel Aviv University’s Computing Division – is why the EduNano partnership is so important.

“EduNano allows us to share resources so that everyone – from high schoolers to graduate students – is better prepared to find their place within the fast-growing nanotech industry,” Barokas says, adding that his own department at Tel Aviv University will host EduNano’s video streaming server and learning management infrastructure. “Producing online courses has become much more affordable in recent years, and we’ll be providing the technical support necessary for us all to learn from each other.”

The TEMPUS EduNano framework gives consortium members the support they need to create video-based e-courses. Participating institutions that already have in-house video production are filming their own modules, while partners that currently lack this capacity will acquire it, with the help of EU funding.

E-Courses for Every Nano Need

Under the EU agreement, every partner institution undertakes to write and film at least two online courses. Covering everything from basic concepts in nanotechnology to in-depth demonstrations of advanced laboratory techniques, these courses will be available for use by the entire consortium by the end of the three-year development period.

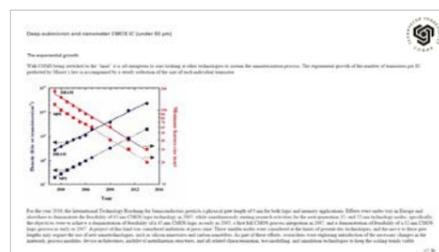
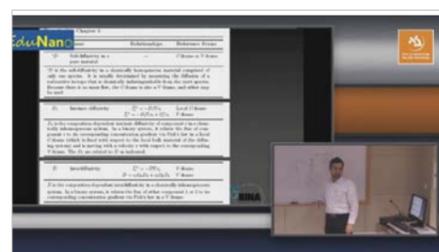
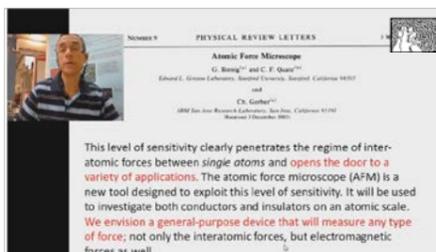
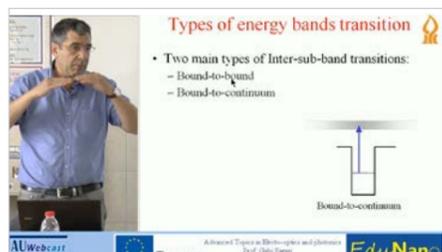
While some of the online courses will be geared toward youth and the general public, the main focus of the TEMPUS program is information sharing and the improvement of educational opportunities for nanoscience graduate students and technicians working in industry.

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The courses currently being prepared are:

- Advance Topics in Nano-Photonics and Quantum Structures (BGU)
- Advanced Materials and Nanotechnologies for Electrochemical Energy Storage (Elbit Systems)
- Atomistic Simulation of Materials (TAU)
- Biochips and Nanostructures Analysis (CIME)
- Bio-Nanoelectronic Devices for BioSensing (Polito)
- CAD for Nanoscale Transistors (TUS)
- Design of Nanoscale ICs (TUS)
- Fundamentals of Nano-Biotechnology: Where Nanotechnology, Biology and Medicine Interface (Technion)
- Introduction to Materials and Nanotechnology for High School Teachers (WIS)
- Introduction to Surface Science (TAU)
- Kinetics of Materials (BIU)
- Macroscopic Quantum Coherence in Engineered Nano-Systems (HUJI)
- Molecular Electronics for the Realization of Novel Nanoelectronic Devices (Polito)
- Nanomaterials for Electronics (TUS)
- Nanomaterials from Nanoskills (TUS)
- Nano-Science and Nano-Technology. Why is “Nano” Different and How is it Useful? (BIU)
- Nanostructures Analysis (CIME)
- Nanotechnology - Journey Through Time and Space Towards Future Drugs (BGU)
- Nanotechnology in the Service of Humanity (HUJI)
- Quantum Mechanics for the Nano Program (Technion)
- Scanning Probe Microscopy and its Applications in Research and in the Nanotechnology Industry (WIS)

In addition to the courses listed above Tel Aviv University is producing a repository of video-based demonstrations of clean room practices related to the fabrication of microelectromechanical system devices (MEMS)



A Student-Centered Approach

EduNano is not just a technical platform for knowledge sharing. The initiative represents an entirely new approach to academic cooperation which fosters active communication between teachers, and between learning communities at all levels.

“The overall coordinator for the consortium is the University of Sofia, with Tel Aviv University serving as the project’s local coordinator among EduNano’s Israeli participants,” says Dr. Efrat Bodner, Administrative Manager of BINA – the Institute of Nanotechnology and Advanced Materials at Bar-Ilan University. “But the TEMPUS program moves beyond the traditional model of collaboration between universities. Instead, it fosters international communication between communities of teachers and students. It promotes high-level learning and collaboration that takes place dynamically, right in the classroom.”

The Weizmann Institute’s Dr. Blonder agrees that EduNano is based on a new – and much-needed – pedagogical approach.

“Education is often structured around passing on concepts that an instructor deems important,” Blonder says. “But if your goal is not simply to ‘finish the material’ but to provide students with skills they can take away and use, that’s student-centered teaching. And that’s what EduNano is all about.”

E-learning provides another ways for course instructors to tailor their teaching to student needs. “Video-based teaching is fun, and engages the senses,” Blonder asserts. “It’s also flexible – allowing teachers to record full classroom lectures, film short videos, or create text-based presentations that are easy to update when new discoveries and techniques emerge.”

Going the Distance – With Distance Learning

“EduNano “democratizes” nanotechnology education, by expanding the reach of local experts to a global audiences, and by making it possible for students to access specialized courses and training modules, even in the absence of local infrastructure,” says coordinator Prof. Tzanova.

Recognizing that it’s not enough to have good research, EduNano is investing in training young researchers, and preparing them for careers that will make a significant contribution to the state of nanotechnology. By sharing knowledge, and by bringing cutting-edge developments into classrooms in every partner country, EduNano is helping to identify, nurture and inspire the nanoscience leaders of tomorrow.

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