

Final Report for The Hebrew University of Jerusalem (HUJI)

Dissemination:

At the Hebrew University 2 courses were produced: "Macroscopic Quantum Coherence in Engineered Nano-Systems" and "Nano in service of humanity".

The materials produced (courses/recordings) are already being used as platforms for future courses. HUJI is now undergoing a significant transition by improving its international teachings and collaborations. Thus this English language material, of high quality, is of great use for this initiative.

We intend to give these courses and expand the student base further, to reach most of our Physics (PhD level) students (with the "Macroscopic Quantum Coherence in Engineered Nano-Systems" course) and to extend and reach also international students coming each year to HUJI, with the "Nano in service of humanity" course.

At our center many industry workers come to use our facilities. Many of them were interested in taking the online courses and some enrolled to the TAU online course.

The Hebrew University- Pilot test included the following courses:

1) The Course "Nanotechnology in Service of Humanity" was offered to bachelor students. This course, originally given as a regular course in Hebrew was recorded in English by many lecturers for the purpose of the consortium and was taken by 8 students. Some impressions of those students who took the online course will be described below. In addition, the course was taught during the last two years and is being taught this year as well. The number of students in this course is impressive. The data of the students who took the frontal course at HUJI and used the on-line materials to repeat a lesson will be presented later..

2) Pilot test of the Course "Macroscopic Quantum Coherence in Engineered Nano-Systems" offered by the Hebrew University to graduate students in Physics. (6 students).

3) Pilot of Course "Surface Science" from Tel Aviv University was promoted at HUJI so that 12 students and some industry employees took the course.

Nanotechnology in Service of Humanity- Pilot test

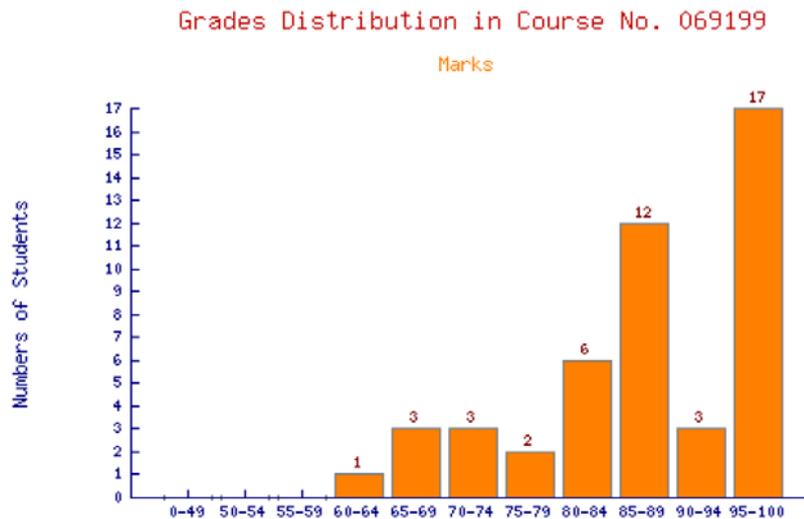
1. The course " Nanotechnology in Service of Humanity" was given to Bachelor students. It is structured according to ECTS
2. The target group of the course were the general Bachelor student population at HUJI (including humanities and social sciences).

3. The material produced are based on recorded lectures, quizzes, exams and interactive forums within the moodle framework.
4. Courses are reviewed and approved by the HUJI administration, both prior and post teaching.
5. Each course undergoes student evaluation via the standard HUJI evaluation process.

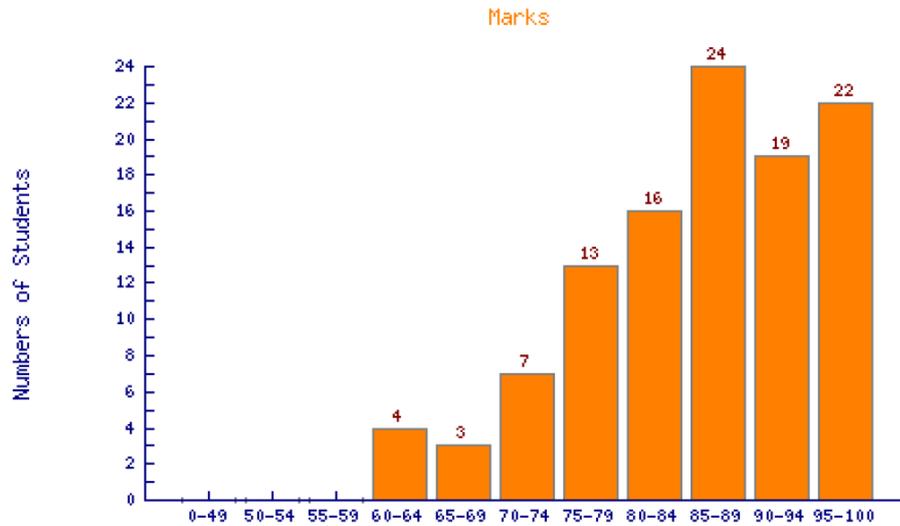
During the first year of 2014/15 55 students participated in the course. 47 of them took the exam and the average grade was 88. 68% were male and 33% female.

In 2015/16 the number of students increased to 124 and 108 of them took the exam. The average score was 84. 46% were male and 54% female.

In the year 2016/17, 83 students participated in this course and the course still is running.



Grades Distribution in Course No. 069199



Responses of students:

"The course was very enjoyable and enriched me about the field of Nanoscience and Nanotechnology..The course was presented in a clear and simple language so that anyone can understand, even if he is not a scientist. I learned what Nano is, its importance and what applications it could provide for mankind. The course was presented nicely. The diversity of the speakers made it even more interesting."

"I would like to thank you very much for your wonderful course on the science of nano for non-scientists. As someone interested in science I find it very difficult gaining access to scientific knowledge for people lacking the necessary scientific background. Your course was fascinating and a wonderful introduction to the nano world. Particularly advantageous were the many topics you managed to cover by inviting many researchers to talk about their fields of interest.

The course was basic but not superficial and opened new worlds for me. The quality of the films was good and the PPT worked smoothly and were nicely visible as well."

Macroscopic Quantum Coherence in Engineered Nano-Systems

1. The course "Macroscopic Quantum Coherence in Engineered Nano-Systems" was given to PhD students (mainly in physics and engineering).
2. It is structured according to ECTS
3. HUJI is part of the European network for ECTS recognition.
4. The target group of the course were the physical sciences PhD student population at HUJI
5. The material produced are based on recorded lectures, quizzes, exams and interactive forums within the moodle framework.
6. Courses are reviewed and approved by the HUJI administration, both prior and post teaching.
7. Each course undergoes student evaluation via the standard HUJI evaluation process.

Responses of students:

"The course "Macroscopic Quantum Coherence in nano-engineered systems" was a very positive and learning online experience for me. I'm a physics student, but I spend a lot of time in the clean room, thus feeling that I sometimes distance myself from the physics and work more like a technician. The course discusses some of the major important ideas in quantum physics relevant for nano-systems, and therefore connects my experimental work with the theoretical background of the last years of my education. The only point of improvement, I would suggest, is more questions to check the student's understanding of the material. Say, after each video-class, two-three questions would be in place".

"It was a very interesting course which gave me a lot of ideas concerning to my research field. I found it very comfortable to take a course online, it gives you the opportunity to tune your work time between the research and the courses."

Student Mobility Feedback

Torino Program

Eight of HUJI students participated in the Torino Program. All of them were from the physics and Applied Physics Departments, except one student who is affiliated to the Life Sciences Department. Three of them are Msc. students and the other 5 students are PhD candidates.

Responses of students:

The course topics were highly innovative and were orientated to students from various disciplines with little experience in the research field but needing to understand the field more in depth.

The lecturers were extremely vivid and kept the audience captivated. The host Prof. Danilo Demarchi was extremely pleasant. He and his team took great care of the students and spent quality time with them. They formulated interactions between the group which was beneficial both on a social and academic level. The Tempus project facilitated better acquaintance for internal collaborations and with other universities in Israel and in Europe. One student noted in particular that this type of intense interaction is far more powerful than any conference because the student has more time to interact with other researchers and exchange ideas in various topics

Grenoble Program:

Five of our students participated in two courses given by CIME. All the students are affiliated to the Faculty of Medicine. All of them were MSc. Students.

The courses given at Grenoble were:

1. MOS transistor manufacturing, with practices on clean room processes, processing technology simulation and MOS transistor electrical characterization.
2. Nano-biotechnology labs, with practices on DNA extraction from a bacteria, DNA labeling by fluorescence, DNA hybridization on an oligonucleotide and AFM manipulation, which can also be used on biological materials.

Responses of students:

Bio-technology Session

A well organized and very educational seminar that taught new methods that students were not familiar with. This experience will benefit the students during their studies and in research. A very interesting and profound lecture on AFM was given first. The lecturer was very nice and enriched us with his vast knowledge. We experienced with lab work on DNA microarray:

DNA was fluorescently labelled and hybridized to an oligonucleotide microarray to detect level of expression. I had experience with PCR but fixing DNA on the chip in order to distinguish DNA impairments was new to me and it was interesting to see this new applications. The lecturer was very professional and explained everything clear and fluent, with patience.

These sessions were well organized in terms of time allotted, background materials provided and instructions. The CIME team was pleasant and helpful. Beside the educational part they provided lunch every day and made a very nice welcoming event. They help us to find accommodation and answer any question we had whether about the lab work or about their scientific background and Grenoble.

This was a unique experience to me. I learned a lot and met interesting researchers from Grenoble and also student from all over my count

Clean-room and Fabrication Session

"This session included fabrication of MOS field-effect-transistors and characterization of their electrical properties. Over the sessions students were exposed to a huge variety of a high standard equipment. The multiple stage process was very inspiring and opened their minds to new techniques useful for their current research. In addition, the interaction with skilled professionals from other institutions who guided us along the workshop and taught us about the facilities and mechanisms that were required to the fabrication process (and also the alternatives techniques, at specific stages) was very enlightening. Even students who had previous experience in clean room environments found that this experience was really extraordinary due the really high quality process and the endless options of fabrication and research. "