EUROTRAINING - 316526

D2.2.2 – Train-the-Trainers courses

DATE	25/06/2015
PROJECT	EUROTRAINING – FP7 - 316526
START DATE AND DURATION	01/01/2013 - 36 months
ABSTRACT	Deliverable D2.2.2 - This document contains the details of the 8+1 T-t-T courses completed: the description of the sites, the programmes and the evaluations of the Train-the-Trainer courses
Dissemination level	PU
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1. Background

The focus of the university training is on supporting graduate schools in advanced nanoelectronics including beyond-CMOS devices. This workpackage is provide the organisation of eight two-day nanosystem awareness courses at eight sites in different East-European countries to enrich the knowledge about this topic and to give a support to those trainers and experts, who are interested in getting acquainted with educational tools that could be used for teaching their students.

The target group includes mainly those trainers and experts of electronics and related disciplines, who come from Eastern Europe. The educational tools should be concise and highly attractive, full with clear figures, animations, videos and other multimedia tools. The selection of the core content of the training is done in cooperation with the trainers. The methodology of the Train-the-Trainers (T-t-T) action is contribute to the development of partnerships between performers of training providers, research institutions and creative industries, thus promoting the well-functioning of the knowledge triangle. The research side of the knowledge triangle is promoted by the inclusion of laboratory visits, hands-on trainings, and presentations of local professors into the agenda. The innovation side of the triangle is emphasized by inviting industrial experts to lecture some novel innovations.

2. Objectives and course site overview

According to the Work Package Description, the time schedule of the organisation and the sites of the Train-the-Trainers courses are as follows:

1st half year:	Survey among expert professors and PhD students to determine the course core content, find the lecturers and the local laboratory to visit.
2nd half year:	1st and 2nd T-t-T courses were held at University Politehnica of Bucharest on 7–8 October, 2013, and at the Technical University of Cluj-Napoca on 9–10 October, 2013.
3rd half year:	3rd and 4th T-t-T courses were held at the Politehnica University of Timisoara on 9–10th April, 2014, and at the University of Novi Sad on 16–17th June, 2014.
4th half year:	5th and 6th T-t-T courses were held at the Rzeszów University of Technology paired with IMAPS Poland 2014 conference on 23–25th September, 2014, and at the Technical University of Kosice on 25–26th September, 2014.
5th half year:	7th and 8th T-t-T courses were held at the CEITEC Brno University of Technology on 24–25th March, 2015, and at the Warsaw University of Technology, Faculty of Mechatronics, Institute of Metrology and Biomedical Engineering on 26–27th March, 2015 One additional (the 9th) course was organised in pair with the 38th International Spring Seminar on Electronics Technology. This course was held in Eger on the 7th of May, 2015.
6th half year:	Summary report on the evaluation of the T-t-T action, conclusions and recommendations.

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3. The survey to determine the core content

3.1. Description of the survey

In order to suit the core content of the T-t-T courses to the expectations of experts, trainers and future trainers, a survey has been conducted about the topics of nanosystems, which is mainly based on the Abstract book prepared in Task 2.4 and distributed among the prospective participants.

In the questionnaire, the first group of the questions was defined in order to describe the person being questioned (i.e. professor, engineer, Ph.D. student, undergraduate student). The second group of questions focused on their general opinion and knowledge about the different topics of nanosystems. The third group of questions focused on the training materials to be included in the T-t-T courses, while the last of the questions referred to their opinion about skills & knowledge required at the moment and in 5 years-time.

The questions are detailed below.

3.2. Questions of the survey

First group:

1. Personal details:
    - 1.1 Title (Mr., Mrs., Dr. etc.):
    - 1.2 First name:
    - 1.3 Last name:
    - 1.4 Organisation:
    - 1.5 Department:
    - 1.6 Role (Ph.D. student, teacher):
    - 1.7 Degree (M.Sc., Ph.D. etc.):
    - 1.8 E-mail:

Second group:

2. Which of the following reflects your opinion about nanotechnologies best? *(select one):*
    - I have high expectations from nanotechnologies
    - I am reasonably optimistic about nanotechnologies
    - I am not really convinced that the benefits justify the effort and the potential risks
    - I am opposed to nanotechnologies
    - I am without an opinion so far

3. Please indicate for each main field of Nanosystems how familiar you are with (5 - very familiar; 1 - not familiar at all):
    - Technology, synthesis, fabrication
    - Materials properties and performance
    - Characterisation techniques
    - Nanoelectronics and other applications

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Third group:

4. Please indicate for each main field of Nanosystems how interested you are in and how gladly you would listen to it on a free seminar (5 - very much/gladly; 1 - not at all):

Technology, synthesis, fabrication

Materials properties and performance

Characterisation techniques

Nanoelectronics and other applications

5. Based on the given Abstract book, please indicate for the following lectures how gladly you would listen to it on a free seminar (5 - very gladly; 1 - not at all):

Technology, synthesis, fabrication

Stephen J. Fonash "The World of Nanotechnology: An Introduction"

Dave Johnson "Intro to Nanofabrication: Top Down to Bottom Up"

Helen McNally "ECET 499N: Introduction to Nanotechnology"

Nick Fang "Illinois ME 498NF: Introduction of Nano Science and Technology"

Nick Fang "Lecture 3: Thinking at the Nanoscale – Departure from continuum"

Helen McNally "ECET 499N Lecture 2: Nanotechnology Background Information"

Rashid Bashir "From Labs-on-Chips to Cellular Machines"

Materials properties and performance

Allen Kimel "Nanotechnology Impact on Materials Properties and Performance"

Timothy S. Fisher "Thermal Energy at the Nanoscale"

Alejandro Strachan "From Atoms to Materials: Predictive Theory and Simulations"

Joerg Appenzeller "Lecture 4: Graphene: An Experimentalist's Perspective"

Characterisation techniques

Helen McNally "ECET 499N Lecture 12: Scanning Probe Microscopy Applications"

Eric Stach "ECET 499N Lecture 8: Electron Microscopy"

Nanoelectronics and other applications

Stephen J. Fonash "Nanotechnology Applications in Today's World"

Tom Morrow "Trends in Nanoelectronics: Microchips and More"

Osama Awadelkarim "How is Nanotechnology Changing the Electronics Industry?"

Mark Lundstrom "Nanoelectronics 101"

Helen McNally "ECET 499N Lecture 3: Nanoelectronics 1"

Helen McNally "ECET 499N Lecture 4: Nanoelectronics 2"

Helen McNally "ECET 499N Lecture 5: Nanoelectronics 3"

Supriyo Datta "ECET 499N: Nanoelectronics"

Travis Benanti "Nanotechnology: Applications in Energy –Solar"

Useful tools

Michael Lesiecki "Nanotechnology Demos and Simulations"

Chanaka Suranjith Rupasinghe; Mufthas Rasikim "ninithi"

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Last group

6. In your opinion, what will be the main nano related skills/knowledge required at the moment? (select one or more):

Technology, synthesis, fabrication
Materials properties and performance
Characterisation techniques
Nanoelectronics
Nanobiotechnology, nanomedicine
Nanomechatronics, NEMS

7. ……and in 5 years-time?

Technology, synthesis, fabrication
Materials properties and performance
Characterisation techniques
Nanoelectronics
Nanobiotechnology, nanomedicine
Nanomechatronics, NEMS

8. Please add any additional comments (optional):

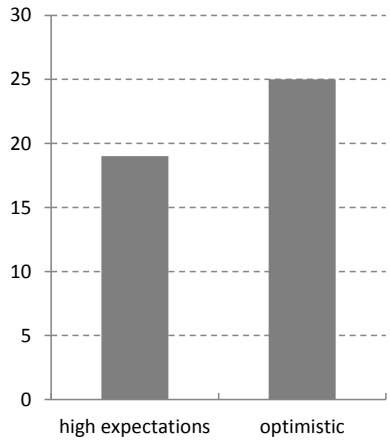
3.3. Results of the survey

The questionnaires have been filled and submitted by over 40 persons from Eastern Europe. Nearly half of them were Ph.D student, precisely, 21 and 23 persons were below and over Ph.D. degree respectively. The respondents indicated that they were very optimistic about nanosystems, and although they are not so familiar with nanosystems, they are very interested in the different topics, especially in nanoelectronics (Questions 3 and 4).

Besides, the participants indicated for all lectures how gladly they would listen to them on a free seminar. Based on the responds, the lectures aligned in decreasing order, and 4 lectures have been chosen among the most interesting lectures to deliver them on the Train-the-Trainer courses. Finally, the respondents have designated that main nano-related skills/knowledge required at the moment are about material properties and nanotechnology, while the most required skill would be about nanoelectronics and nano-biotechnology in 5 years-time. The detailed results of the survey are presented below.

2. Which of the following reflects your opinion about nanotechnologies best? (select one):

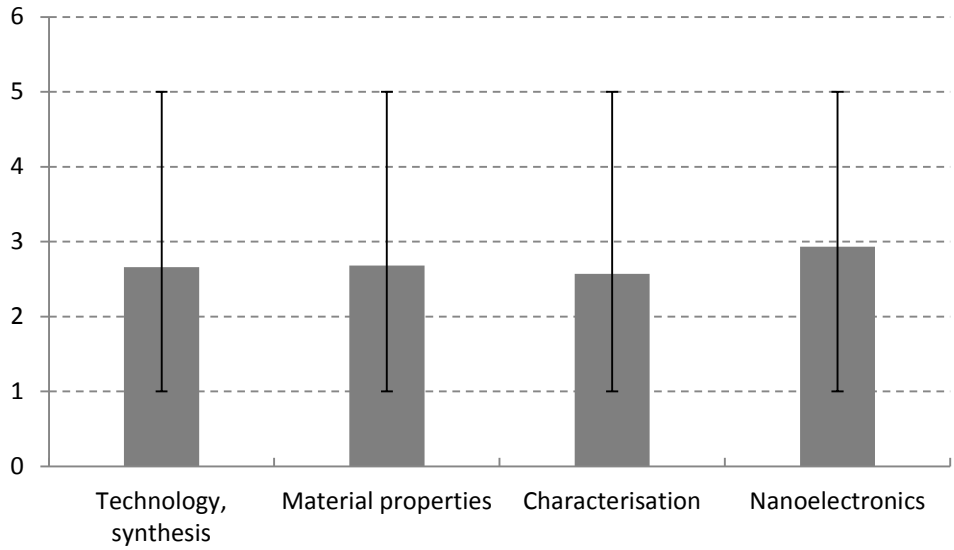
	Σ
I have high expectations from nanotechnologies	**19**
I am reasonably optimistic about nanotechnologies	**25**
I am not really convinced that the benefits justify the effort and the potential risks	**0**
I am opposed to nanotechnologies	**0**
I am without an opinion so far	**0**



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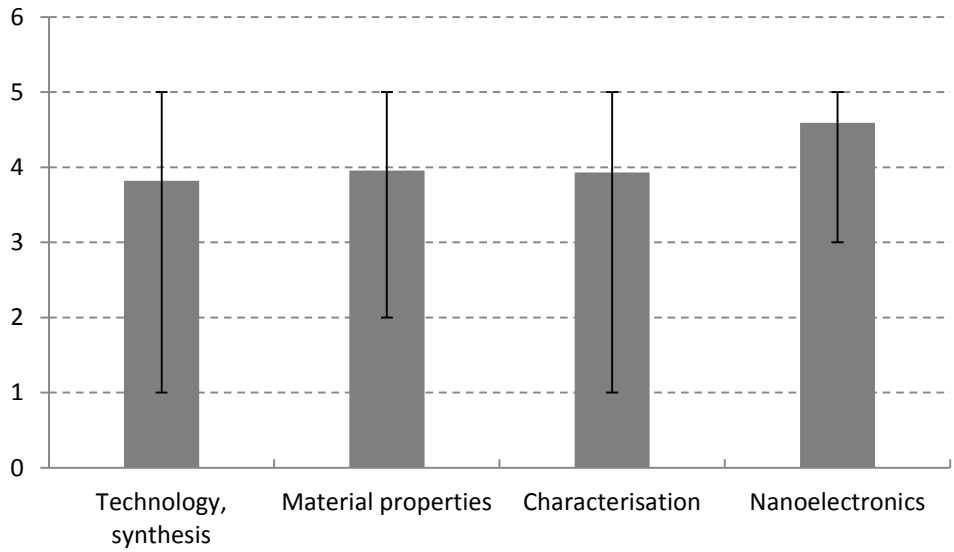
3. Please indicate for each main field of Nanosystems how familiar you are with (5 - very familiar; 1 - not familiar at all):

	avg.	R	Max	Min
Technology, synthesis, fabrication	**2,7**	**4**	**5**	**1**
Materials properties and performance	**2,7**	**4**	**5**	**1**
Characterisation techniques	**2,6**	**4**	**5**	**1**
Nanoelectronics and other applications	**2,9**	**4**	**5**	**1**



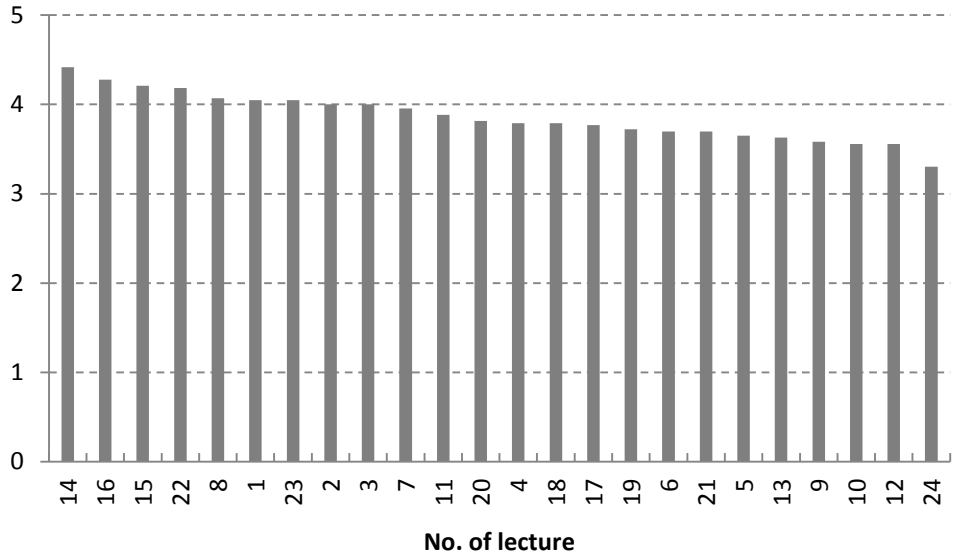
4. Please indicate for each main field of Nanosystems how interested you are in and how gladly you would listen to it on a free seminar (5 - very much/gladly; 1 - not at all):

	avg.	R	Max	Min
Technology, synthesis, fabrication	**3,8**	**4**	**5**	**1**
Materials properties and performance	**4,0**	**3**	**5**	**2**
Characterisation techniques	**3,9**	**4**	**5**	**1**
Nanoelectronics and other applications	**4,6**	**2**	**5**	**3**



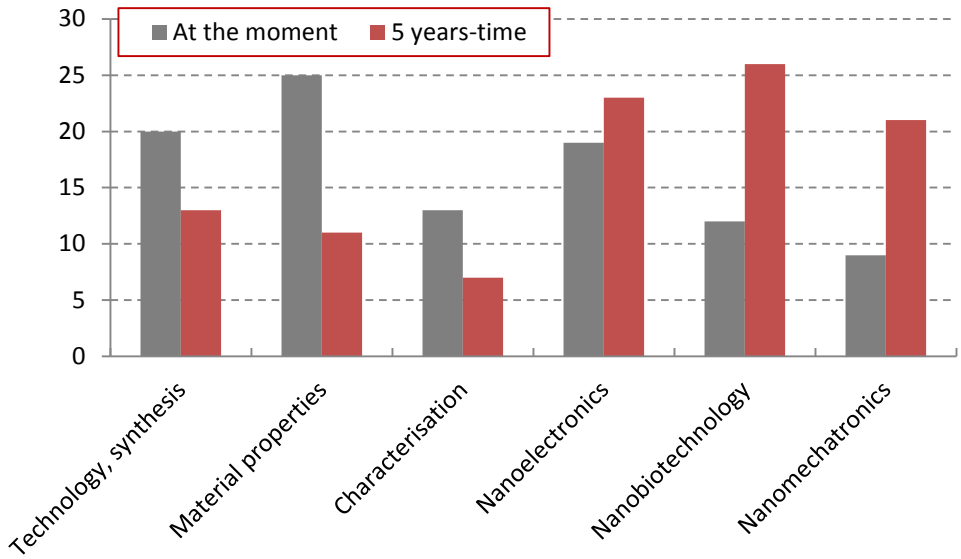
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5. Based on the given Abstract book, please indicate for the following lectures how gladly you would listen to it on a free seminar (5 - very gladly; 1 - not at all):



6+7. In your opinion, what will be the main nano related skills/knowledge required at the moment and in 5 years-time? (select one or more):

	Now	5 years
Technology, synthesis, fabrication	**20**	**13**
Materials properties and performance	**25**	**11**
Characterisation techniques	**13**	**7**
Nanoelectronics	**19**	**23**
Nanobiotechnology, nanomedicine	**12**	**26**
Nanomechatronics, NEMS	**9**	**21**



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4. The Train-the-Trainer courses

The first pair of the Train-the-Trainer courses has been organised in Romania. The two sites were University Politehnica of Bucharest on 7–8 October, 2013 and the Technical University of Cluj-Napoca, on 9–10 October, 2013. The programme of the courses is developed based on the results of the survey (Section 3.) and on the Description of the Work.

4.1. Selecting the lectures for the T-t-T courses

Based on the results of the survey, the most interesting lectures are the following:

14: Stephen J. Fonash "Nanotechnology Applications in Today's World"
16: Osama Awadelkarim "How is Nanotechnology Changing the Electronics Industry?"
15: Tom Morrow "Trends in Nanoelectronics: Microchips and More"
22: Travis Benanti "Nanotechnology: Applications in Energy –Solar"
08: Allen Kimel "Nanotechnology Impact on Materials Properties and Performance"
01: Stephen J. Fonash "The World of Nanotechnology: An Introduction"
23: Michael Lesiecki "Nanotechnology Demos and Simulations"
02: Dave Johnson "Intro to Nanofabrication: Top Down to Bottom Up"

From these lectures, four of them have been chosen to deliver in the first days of the two-day Train-the-Trainer courses. The abstracts of the chosen lectures are as follows:

Stephen J. Fonash "Nanotechnology Applications in Today's World„
http://elluminate.mesacc.edu/play_recording.html?recordingId=1277836648560_1285344098830



Stephen J. Fonash

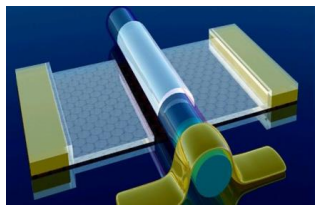
Bayard D. Kunkle Chair in Engineering Sciences, Director Center for Nano-technology Education and Utilization

The Pennsylvania State University

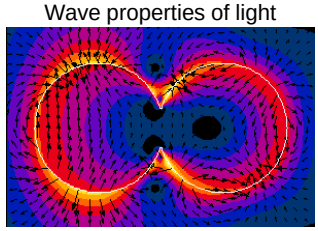
Abstract

Before taking a quick tour through some of today's applications of Nanotechnology, we must ask "what is so different about the nano-scale"? The answer is: small size – can get a lot of nano-things in an area or volume; most atoms are at the surface and their electron distributions are different than that of an isolated atom or that of the atoms in a bulk solid; wave properties of light become important for the small structures and nature allows some unusual chemical bonding for nano-scale structures. These opportunities available at the nano-scale should be and are used by engineers and scientists to make new materials and, from these new materials, come new devices and structures.

High-speed graphene transistor



Wave properties of light



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Osama Awadelkarim "How is Nanotechnology Changing the Electronics Industry?"

http://elluminate.mesacc.edu/play_recording.html?recordingId=1311874826010_1330102989559



Osama Awadelkarim

Associate Director, NACK

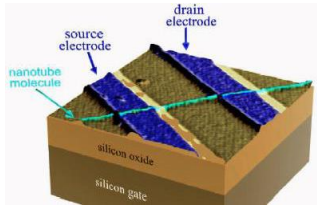
Professor of Engineering Science and Mechanics

The Pennsylvania State University

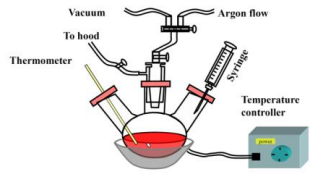
Abstract

For 50 years, electronics have run on silicon transistor technology. Over those years, that technology has continually been scaled down to the point now further shrinkage is difficult. Continuing evolution of electronics beyond the limits of the conventional silicon technology (top-down approach, lithography technology) requires innovative approaches for solving heat dissipation, speed and scaling issues. Many people have suggested that the microelectronics industry has to stop using top-down nanofabrication and must move to bottom-up or hybrid nanofabrication. If this worked, it would stop the spiralling costs of producing nano-scale transistors.

Carbon Nanotube Transistor



Synthesis of Quantum Dots



Tom Morrow "Trends in Nanoelectronics: Microchips and More„

https://sas.elluminate.com/site/external/launch/nativeplayback.jnlp?sid=2012302&psid=2013-01-25.1007.M.13BC40C9350636C02C7F877AFA0927.vcr



Tom Morrow

Executive Vice President of Global

Emerging Markets and Officer of Chief Marketing

SEMI global industry association

Abstract

The penetration of semiconductors into our everyday lives is accelerating, being driven by Moore's Law and Haitz's Law, the two most powerful economic and social forces of our time. Many of the same technologies and processes developed to make today's most advanced microchips are now being utilized in solar energy, LEDs (including Smart Lightning), MEMS, displays, printed, and large area electronics. Discover how nanotechnology and nanoelectronic innovations are driving today's commercial or high-reliability automotive electronics revolution and how they will shape our future.

LEDs, adaptive lightning



Printed electronics in action



Allen Kimel "Nanotechnology Impact on Materials Properties and Performance„

http://elluminate.msacc.edu/play_recording.html?recordingId=1311875023430_1335458131773



Allen Kimel

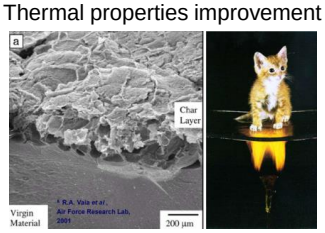
Assistant Professor, Associate Head for Undergraduate Studies

The Pennsylvania State University – Materials Science and Engineering

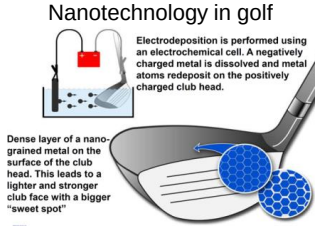
Abstract

By using structure at nanoscale as a tuneable physical variable, we can greatly expand the range of performance of existing chemicals and materials. For example, ceramics, which normally are brittle, can easily be made deformable when their grain size is reduced to the low nanometre range. Switching devices and functional units at nanoscale can improve computer storage and operation capacity by a factor of a million, while nanostructured metals have greatly improved mechanical properties, both in ductility and strength. That is the reason why nanotechnology has attracted large amounts of funding, research activity and media attention.

Thermal properties improvement



Nanotechnology in golf



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4.2. Promoting the Train-the-Trainer courses and registration

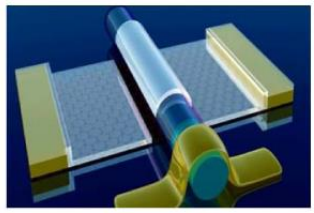
For promoting the Train-the-Trainer courses, a flyer and a registration form have been designed. The layout will be similar for the next courses too; the name of place, the date and the logos will be changed accordingly. The layouts of the T-t-T flyer and the registration form are illustrated below.

EUROTRAINING

Nanotechnology for Electronics

7–8 October, 2013, UPB & IMT, Bucharest, Romania

This two-day course is part of the EuroTraining project's Train-the-Trainers task, which aim is to enrich the knowledge about nanosystems and to give support to those trainers and experts, who are interested in getting acquainted with educational tools that could be used for teaching their students.



Program at a glance

Day 1.

- 09:00–10:45 Webcasts: Nanotechnology applications and trends
- 10:45–11:00 Coffee break
- 11:00–13:00 Webcasts: Nanotechnology in electronics and materials
- 13:00–13:45 Lunch break
- 13:45–15:00 Novel devices, applications and trends
- 15:00–15:15 Coffee break
- 15:15–16:30 Applications of nanotechnology
- 16:30–16:45 Coffee break
- 16:45–17:30 Problem solving discussion

Day 2.

- 08:30–09:15 Nanotechnology equipment development
- 09:15–10:00 Current research results
- 10:00–10:15 Coffee break
- 10:15–12:00 Practical demonstration and laboratory visit
- 12:00–12:30 Farewell coffee with discussion and course evaluation

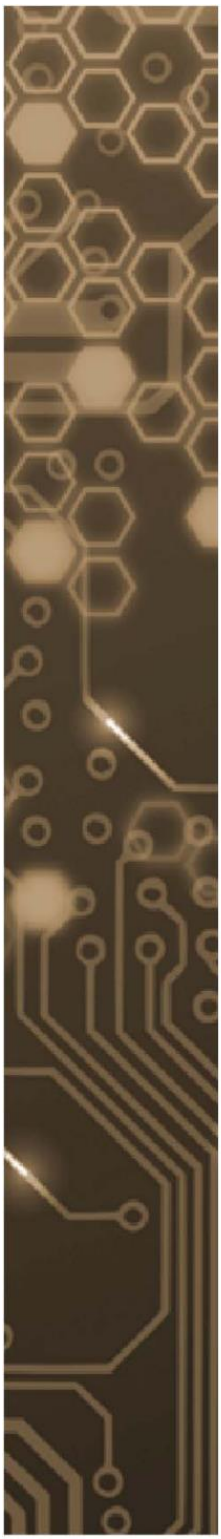


Fee and registration

The participation in the two-day course is free of charge. Please register by downloading and filling the registration form from the following link: www.ett.bme.hu/eurotraining and sending it back to Zsolt Illyefalvi-Vitéz (illye@ett.bme.hu) or to Oliver Krammer (krammer@ett.bme.hu).

Eurotraining (GA No.: 316526) – "Provision of a European Training Infrastructure"

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Nanotechnology for Electronics

7–8 October, 2013, UPB & IMT, Bucharest, Romania

Course Registration Form

University / company

Title First Name Last Name

Position

City Country

Phone E-Mail

Attending: Day 1. ☐ Day 2. ☐

Please send your registration to:

E-mail: illye@ett.bme.hu (Zsolt Illyefalvi-Vitéz) or
E-mail: krammer@ett.bme.hu (Oliver Krammer) or
(Fax: +36 1 463-4118)

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4.3. Programme of the first pair of Train-the-Trainer courses

The programme of the first pair of T-t-T courses consisted several parts. At first, 4 lectures (webcasts) were delivered as an introduction to nanosystems. After that, presentations of an invited renowned scientist and of a young presenter followed. The aim of these presentations was to show, how nanosystems and nanotechnology can be lectured; what kind of methodology is effective. At last, the first day is ended with a Problem Solving Discussion with the participation of the renowned scientists, the young East-European presenter, industrial experts and the EuroTraining delegates.

The second day started with the presentation of an industrial expert and followed by the presentation and demonstration of a local scientist about up-to-date research results. Finally, the two-day courses ended with practical demonstrations and laboratory visit. The detailed programme of the first site (Bucharest) was as follows:

1st Day Program: 7th October, 2013; Course site: Campus Leu, Building B, Room 206

09:00-09:05 Introduction

09.05-10.45 Delivery of two webcasts: Nanotechnology applications and trends

Stephen J. Fonash: "Nanotechnology Applications in Today's World"

Tom Morrow: "Trends in Nanoelectronics: Microchips and More"

10.45-11.00 Coffee break

11.00-13.00 Delivery of two webcasts: Nanotechnology impact on the performance of electronics and materials

Osama Awadelkarim: "How is Nanotechnology Changing the Electronics Industry?

Allen Kimel: "Nanotechnology Impact on Materials Properties and Performance"

13.00-13.45 Lunch break

13.45-15.00 Nanotechnology – novel devices, applications and trends - Invited renowned scientist

János Mizsei: "Electronics, microelectronics, nanoelectronics, …"

15.00-15.15 Coffee break

15.15-16.30 Applications of nanotechnology - Young East European scientist

Attila Bonyár: "Enhancing Biosensors with Nanotechnology"

16.30-16.45 Coffee break

16.45-17.30 Problem solving discussion – with the participation of the invited renowned scientist, the young East-European presenter, industrial experts and the EuroTraining delegates.

2nd Day Program: 8th October, 2013; Course site: Campus Leu, Building B, Room 206

08.30-09.15 Presentations about nanotechnology equipment development - Industrial expert from Raith, Germany

Martin Kirchner: "Instrumentation and processing with electron and ion beam lithography"

09.15-10.00 Presentations about current research results - Local scientists about up-to-date research results

Detlef Bonfert, Ciprian Ionescu: "Electronic Conductive Layers containing Nanoparticles", including "Sensing Properties of Carbon Nanotube-Polymer Layers on Foils"

10.00-10.15 Coffee break, preparation for the laboratory visit

10.15-12.00 Practical demonstration and laboratory visit

Visit site: Campus Grozăvești, Building JK, Rooms: 010, 011, 209, and 211

Visit to the Department of Metallic Materials Science and Physical Metallurgy and the Biomaterials Research Centre (BioMat http://www.biomat.ro/) at the Materials Science and Engineering Faculty, UPB.

12.00-12.30 Farewell coffee with discussion and course evaluation

12.30 Disperse

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Based on the experiences of the course held in Bucharest, some of the webinars were omitted at the next site (Cluj-Napoca) and more time was given to the live presentations. Two local young scientists were invited too to give an overview about their scientific research. The topics (short abstract) of the local young scientists in Cluj-Napoca were the following:

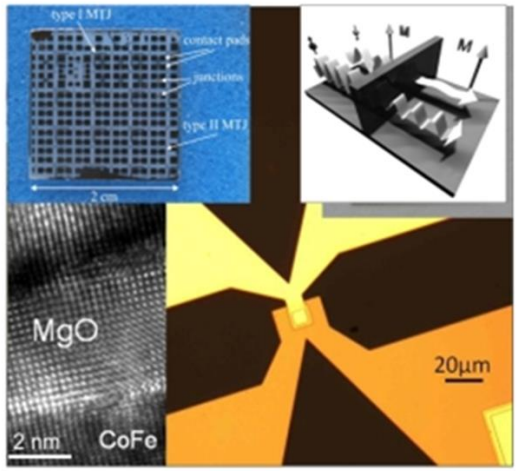
Mihai Gabor: "Spintronic devices for sensor and data storage applications"



Mihai Gabor
PhD. Assistant Professor
Center for Superconductivity, Spintronics and Surface Science (C4S)
Department of Physics and Chemistry
Technical University of Cluj-Napoca, Romania

Abstract:

The manipulation of the spin degree of freedom in solid-state systems and the study of the related physical phenomena generated, over the last decades, a rapidly emerging field of science and technology: the spintronics. The discovery of Giant Magnetoresistance effect (GMR) and Tunneling Magnetoresistance (TMR) effect in multilayer structures radically changed the data storage technology.



Nowadays, the MTJs constitute the elementary bricks of different magnetic random-access memories (MRAM) prototypes, field sensors and read-heads in HDD hard disk drives or high frequency oscillators. Within the extremely dynamic research field of spintronics, ongoing studies are focused on elaboration and study of new materials and devices with customized magnetic and spin dependent transport properties.

Traian Petrişor Jr. "Alternative methods for nanolithography"

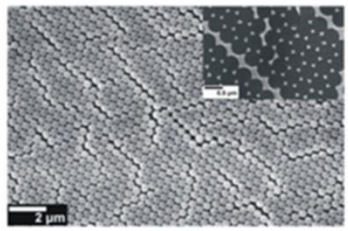


Traian Petrişor Jr
PhD, Assistant Professor
Center for Superconductivity, Spintronics and Surface Science (C4S)
Department of Physics and Chemistry
Technical University of Cluj-Napoca, Romania

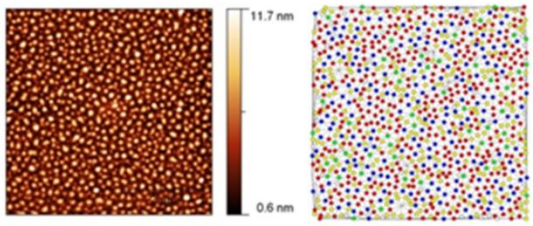
Abstract:

Two paths are presented for the fabrication of nano-scale objects. They represent alternatives to the other well-established techniques currently used in nano-fabrication. The first consists in the use of self-assembled polystyrene nano-spheres correlated with ion beam etching, for defining different nanometric geometries. The second makes use of the micro-domain separation of diblock copolymers in order to produce nanometric lithographic mask for the ion beam etching of thin films or multilayers. The presentation focuses on the results, current research status and issues regarding the described techniques.

Self-assembly of PS nano-spheres



Microphase separation of PS-b-PMMA diblock copolymer



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Thus, the programme for the T-t-T course in Cluj-Napoca was:

1st Day Program: 9th October, 2013; Course site: Aula Domsa, 15 Str Constantin Daicoviciu, UTCN

09:00-09:30	Introduction
09.30-10.45	Delivery of a webcast: Nanotechnology impact on the performance of electronics and materials *Osama Awadelkarim: "How is Nanotechnology Changing the Electronics Industry?*
10.45-11.00	Coffee break
11.00-13.00	Nanotechnology – novel devices, applications and trends - Invited renowned scientist *János Mizsei: "Electronics, microelectronics, nanoelectronics, …"*
13.00-14.00	Lunch break
14.00-15.15	Applications of nanotechnology - Young East European scientist *Attila Bonyár: "Enhancing Biosensors with Nanotechnology"*
15.15-15.30	Coffee break
15.30-16.45	Presentations about nanotechnology equipment development - Industrial expert from Raith, Germany *Martin Kirchner: "Instrumentation and processing with electron and ion beam lithography"*
16.45-17.00	Problem solving discussion – with the participation of the invited renowned scientist, the young East-European presenter, industrial experts and the EuroTraining delegates.

2nd Day Program: 10th October, 2013; Course site: Aula Domsa, 15 Str Constantin Daicoviciu, UTCN

08.30-10.00	Presentations about current research results - Local scientists about up-to-date research results *Mihai Gabor: "Spintronic devices for sensor and data storage applications"* *Traian Petrişor Jr. "Alternative methods for nanolithography"*
10.00-10.15	Coffee break, preparation for the laboratory visit
10.15-12.00	Practical demonstration and laboratory visit Visit to the Center of Superconductivity, Spintronics and Surface Science (C4S), Faculty of Materials Science and Engineering at the Technical University of Cluj-Napoca (TUCN), http://www.c4s.utcluj.ro
10.15-12.00	Practical demonstration and laboratory visit
12.00-12.30	Farewell coffee with discussion and course evaluation
12.30	Disperse.

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4.4. Evaluation of the courses and experiences

For evaluating the courses, an evaluation form was designed. The evaluation form was distributed among the participants after the two-day courses and the results have been summarised. The layout of the course evaluation form is illustrated below:

Nanotechnology for Electronics

9–10 October, 2013, Technical University of Cluj-Napoca, Romania

What do you think?

Thank you for answering the following questions and for sending back this form to Zsolt Illyefalvi-Vitéz illye@ett.bme.hu or to Oliver Krammer krammer@ett.bme.hu.

***Please mark each question from 1** (very bad) **to 10** (excellent).*

Organisation:	**Grade** From 1 to 10	**Remarks**
Course location, city	10	
Classroom and technical equipment	10	
Coffee breaks	10	

Course:	**Grade** From 1 to 10	**Remarks**
Course content (compared to your expectations)	10	
Proportion of theoretical and practical issues	10	
Course material (presentation, etc.)	10	
How useful was the course for your studies?	10	
How well would the course help you in teaching?	10	

Lecture types:	**Grade** From 1 to 10	**Remarks**
Webinar	10	
Presentation of scientists (young, renowned, local)	10	
Presentation of industrial representative	10	
Lab tours	10	

Your occupation: ☐ student ☐ Ph.D. student ☐ senior scientist ☐ engineer ☐ other

Your professional / educational field: ☐ Electronics ☐ Electronics technology ☐ Communications ☐ Semiconductor science ☐ Material science ☐ other

Further remarks and suggestions *(optional):*

Thanks for your help!

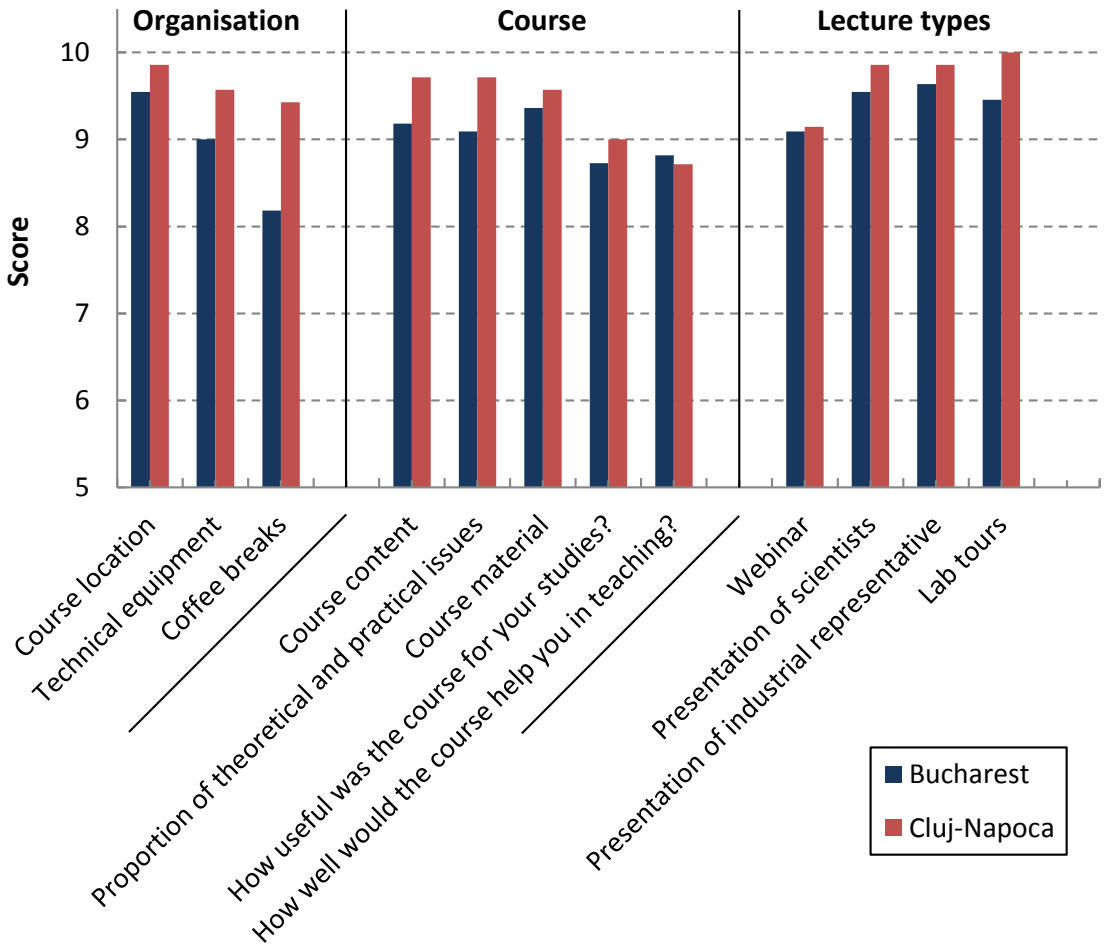
EUROTRAINING



TECHNICAL UNIVERSITY OF CLUJ-NAPOCA ROMANIA

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Results of the course evaluation



Some characteristics comments from the evaluations:

General comments:

Very interesting indeed. The Webinar idea is very useful and less expensive.

Thank you for opportunity to learn from this course!

It was a pleasure to participate in the EuroTraining course entitled "Nanotechnology for Electronics", held between 9-10 Oct 2013, at the Technical University of Cluj-Napoca.

The "Nanotechnology for Electronics" course was very useful for understanding the latest news in nanotechnology and the bridges of it with electronics. I highly appreciate this type dissemination course.

Useful comments from the evaluation forms to some categories:

Organisation */ Course location, city*
Location was chosen very well

Organisation / Coffee breaks
The coffee breaks were too short and the courses were very long. After 1 course of 2h one break is necessary

Course */ Course content (compared to your expectations)*
Very interesting
Full with novelties

Course / Proportion of theoretical and practical issues
Maybe more theoretical issues were necessary

Course / Course material (presentation, etc.)
The online presentations were very difficult to be followed
Too bad the audio for the first presentation was not very clear

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Comprehensive and very well realised

Course / How useful was the course for your studies?
Useful for me, I have some lessons in field of nanostructured materials
Very useful
Can be used for master level

Course / How well would the course help you in teaching?
I think the materials presented are too advanced for teaching at BSc, rather address MsC or PhD levels.
It helps me significantly in teaching

***Lecture types** / Webinar*
Comprehensive and very well realised

Lecture types / Presentation of scientists (young, renowned, local)
We were happy to see local developments included in the presentations.
High quality presentations

Lecture types / Presentation of industrial representative
Very interesting

Lecture types / Lab tours
We visit only characterisation labs, maybe some electronic labs were more interesting
Very interesting

Summary of the experiences

The experiences of the first pair of Train-the-Trainer courses were as follows:

- the courses were successful with approximately 35–40 participants on each event;
- the live presentation drew more attention than the webcasts, that was why a corrective action was taken to the second site, Cluj-Napoca;
- the local renowned scientists could deliver very good lectures and the presentations of the local young-scientist were very interesting also.
- The course participants (mainly from the field of electronics) greatly appreciated to get acquainted with nano/technology related disciplines which highly influences the electronics itself.
- The practical demonstrations and lab visits were very successful too.

Links for the 1st and 2nd Train-the-Trainer courses:

T-t-T Flyer - Bucharest, 7-8 October, 2013;
http://www.eurotraining.net/pdf/EuroTraining_Flyer_Bucharest_7-8Oct2013.pdf

T-t-T Course Program - Bucharest, 7-8 October, 2013;
http://www.eurotraining.net/pdf/EuroTraining_Course_Program_Bucharest_7-8Oct2013_v3.pdf

T-t-T Flyer - Cluj-Napoca, 9-10 October, 2013;
http://www.eurotraining.net/pdf/EuroTraining_Flyer_Cluj-Napoca_9-10Oct2013.pdf

T-t-T Course Program - Cluj-Napoca, 9-10 October, 2013;
http://www.eurotraining.net/pdf/EuroTraining_Course_Program_Cluj-Napoca_9-10.Oct.2013_v4.pdf

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4.5. 3rd and 4th Train-the-Trainer courses

The 3rd and 4th T-t-T course were held at the Politehnica University of Timisoara (9–10th April, 2014) and at the University of Novi Sad (16–17th June, 2014). The first day of the 3rd course started with the presentation of the renowned scientist, János Mizsei, and then continued with the presentations of the industrial representative and the young scientist: Martin Kirchner and Attila Bonyár respectively. In the second day, the practical demonstration was organised in Continental Automotive Romania SRL, where the laboratory equipment used for qualifying automotive electronic products was presented. The equipment for life-time tests was especially attractive. In Novi-Sad, the industrial representative was Hervé Fanet from CEA-LETTI, and the practical demonstration is focused on printable electronics.

The programme of the 3rd course in Timisoara was:

1st Day Program: 9th April, 2014 Course site: Continental Automotive Romania SRL

13.00-13.15 Introduction

13.15-14.45 Nanotechnology – novel devices, applications and trends - Invited renowned scientist *János Mizsei: "Electronics, microelectronics, nanoelectronics, …"*

14.45-15.00 Coffee break

15.00-16.15 Presentations about nanotechnology equipment development - Industrial expert from Raith, Germany

Martin Kirchner: "Instrumentation and processing with electron and ion beam lithography"

16.15-17.15 Applications of nanotechnology - Young East European scientist

Attila Bonyár: "Enhancing Biosensors with Nanotechnology"

17.15-17.30 Problem solving discussion – with the participation of the invited renowned scientist, the young East-European presenter, industrial experts and the EuroTraining delegates.

2nd Day Program: morning, 10th April, 2014 Course site: Continental Automotive Romania SRL

10.00-13.00 Practical demonstration: Visit to Continental Automotive Romania

2nd Day Program: afternoon, 10th April, 2014 Course site: Politehnica University of Timisoara (senate room)

14.15-14.30 Welcome from universities

14.30-15.10 Alain Michel: „The role of simulation in high performance electronic design"

15.10-15.50 Bálint Medgyes: „Dendrites: Secret Pests in Microelectronics"

15.50-16.30 Alexander Neufeld: „Smart electronics in home appliances"

16.30-17.00 Networking break

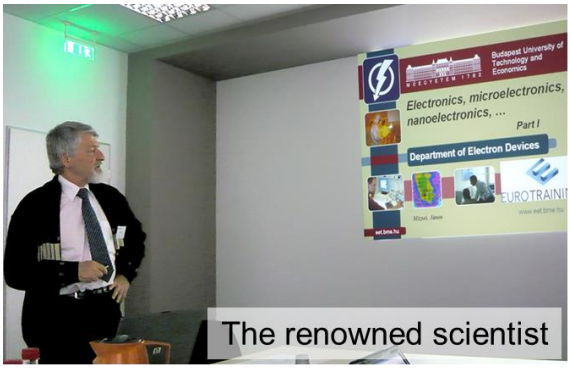
17.00-17.40 Zsolt Illyefalvi-Vitéz: „Life-time prediction of Soldered Joints"

17.40-18.20 Ioan Plotog: „DFM concept integrated in the predicted Life Cycle of a new product"

18.20-19.00 Balázs Illés: „Nano-characterisation in tin whisker research"

19.00-19.30 Farewell coffee with discussion and course evaluation

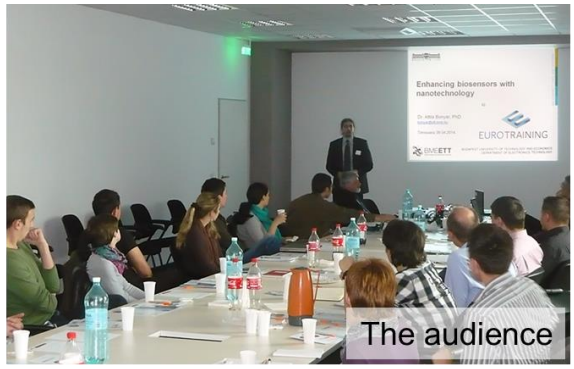
Some photos about the course in Timisoara are presented below:





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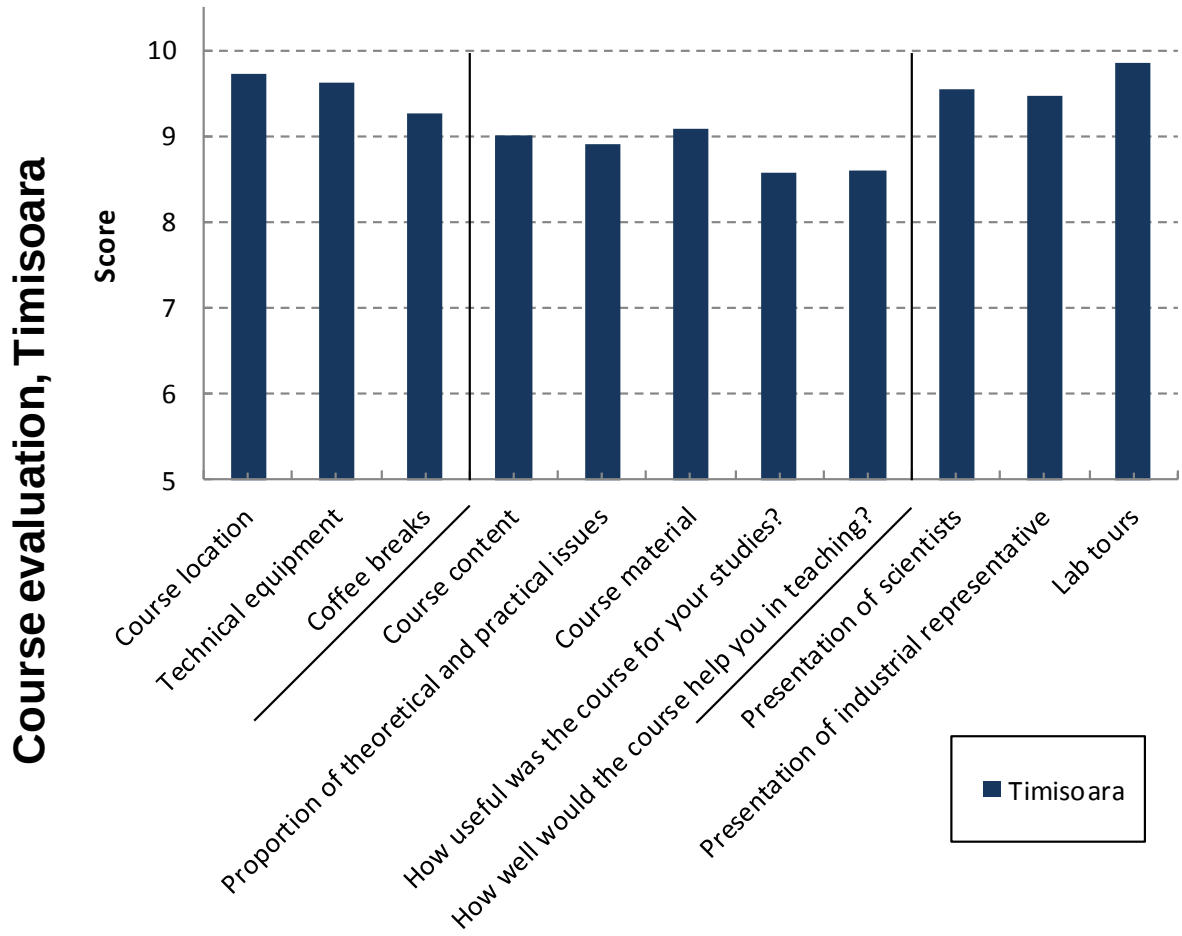








The evaluation of the course is can be found in the following plot. The course obtained very good scores between 8.6 and 9.8:



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The programme of the 4th course in Novi Sad was as follows. The delivery of webcast was excluded because of the high interest and long discussion about the topics of live presentations:

1st Day Program: 16th June, 2014 – Course site: Centre for Integrated Microsystems and Components – CIMC

10.30-10.45	Introduction
10.45-11.45	Nanotechnology – novel devices, applications and trends *László Juhász: „Electronics, microelectronics, nanoelectronics, …"*
11.00-12.45	Novel devices, applications and trends - Invited renowned scientist *Goran Radosavljević: „LTCC materials and their application for realization of Passive Components and Sensor Systems"*
12.45-13.45	Lunch break
13.45-15.00	Presentations about innovations for industry – expert from CEA-LETI, France *Hervé Fanet: „Energy efficient nanoelectronics"*
15.00-16.00	Delivery of a webcast: Nanotechnology impact on the performance of electronics and materials Osama Awadelkarim: „How is Nanotechnology Changing the Electronic Industry?"
16.00-16.15	Coffee break
16.15-17.15	Applications of nanotechnology - Young East European scientist *Attila Bonyár: "Enhancing Biosensors with Nanotechnology"*
17.15-17.30	Problem solving discussion – with the participation of the invited renowned scientist, the young East-European presenter, industrial experts and the EuroTraining delegates.

2nd Day Program: 17th June 2014 – Course site: Centre for Integrated Microsystems and Components – CIMC

08.30-10.00	Presentation of local scientists about up-to-date research results *Aleksandar Menićanin: „Inkjet Printed Layers with Nanoparticle Silver on Polyimide Substrate"* *Nelu Blaž: „Various types of Displacement Sensors"* *Čedo Žlebič: „Comparison of Resistive and Capacitive Strain Gauge Sensors Printed on Polyimide Substrate Using Ink-Jet Printing Technology"* *Djordjije Tripkovic: „Preparation of BaTiO3 sols suitable for thin films fabrication using inkjet printing process"*
10.00-10.30	Coffe break
10.30-12.00	Practical demonstration and laboratory visit – Visit to the Laboratories of CIMC, at the Faculty of technical Sciences, University of Novi Sad, Republic of Serbia, http://www.cimc.rs/
12.00-12.30	Farewell coffee with discussion and course evaluation

Some photos about the course in Novi Sad are presented below:

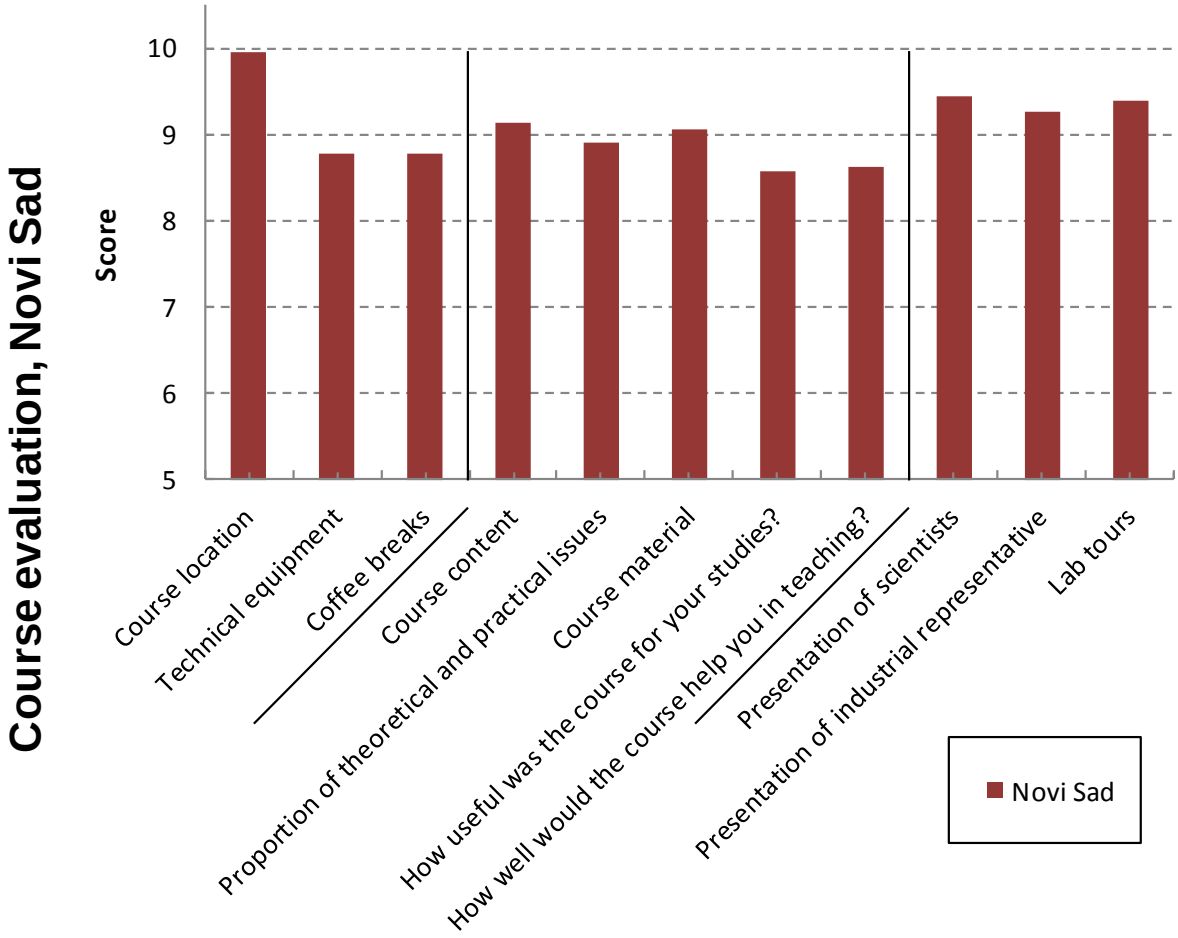


The industrial expert


The audience

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The evaluation of the course is can be found in the following plot. The course obtained very good scores between 8.7 and 10:



Links for the 3rd and 4thTrain-the-Trainer courses:

T-t-T Flyer - Timisoara, Romania, 9 - 10 April 2014;
http://www.eurotraining.net/pdf/EuroTraining_Flyer_Timisoara_9_10_April_2014.pdf

T-t-T Course Program - Timisoara, Romania, 9 - 10 April 2014;
http://www.eurotraining.net/pdf/EuroTraining_Course_Program_Timisoara_2014April9-10_v3.pdf

T-t-T Flyer - Novi Sad, Serbia, 16 - 17 June 2014;
http://www.eurotraining.net/pdf/EuroTraining_Flyer_NoviSad_2014June16_17.pdf

T-t-T Course Program - Novi Sad, Serbia, 16 - 17 June 2014;
http://www.eurotraining.net/pdf/EuroTraining_Course_Program_NoviSad_2014June16_17_v3.pdf

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4.6. 5th and 6th Train-the-Trainer courses

The 5th and 6th T-t-T courses were at the Rzeszów University of Technology paired with IMAPS Poland 2014 conference (23–25th September, 2014) and at the Technical University of Kosice (25–26th September, 2014). In the 5th course, after the course day at IMAPS Poland, the practical demonstration was organised in the laboratory of Department of Electronics and Communication Systems - Politechnika Rzeszowska. The laboratory is well equipped for investigating thick-film technology and nano particle added inks. In the 6th course, the practical demonstration included the presentation of the most recent research results in the field of Organic Large Area Electronics and printable electronics. The programme of the 5th course in Czarna and Rzeszów was:

1st Day Program: 23rd September, 2014 Course site: IMAPS CPMT Conference, Czarna, Poland

10.15-10.30 Introduction

10.30-11.00 Presentations about current research results – Presentation of local scientists

Wroblewski, Grzegorz: „Carbon nanomaterials dedicated to PV module heating system"

11.00-11.30 Coffee break

11.30-13.00 Poster Presentations of papers selected from the IMAPS CPMT conference

Allaf, Kamil Nouri: „Application of molecular modelling in micro and nano material technologies"

Izydorczyk, Weronika: „Microstructure and NO2 gas-sensing properties of SnO2 thin films and nanowires"

Grzegorz Błąd: „Modification of Liquid Crystalline Phases by Nanomaterial Dopants for the Electronic Devices Elements"

Illyefalvi-Vitez, Zsolt: „Global Networks on Nanotechnology Education"

Wyżkiewicz, Iwona: „Graphene inks for industrial printing techniques"

Sobaszek, Michał: „High refractive index ultra-thin nanocrystalline boron doped diamond film for NIR waveguiding"

Fałat, Tomasz: „Low-temperature sintered nano-silver based thermal interface materials"

Wróblewski, Grzegorz: „Spray coated graphene nanoplatelets and carbon nanotubes oriented in constant electric field for transparent and elastic electrodes"

Krammer, Oliver: „Micro- and nano characterisation of intermetallics in lead-free solder joints"

Futera, Konrad: „Inkjet printed microwave circuits on flexible substrates using heterophase graphene based inks"

Tomaszewski, Grzegorz: „Investigation of ink spreading on various substrates in inkjet technology"

2nd Day Program: 24th September, 2014 Course site: IMAPS CPMT Conference, Czarna, Poland

9.00-9.15 Introduction

9:10-9:50 Nanotechnology – novel devices, applications and trends – Presentation of an invited renowned scientist

Mizsei, János: „Electronics, microeletronics, nanoelectronics"

9:50-10:30 Presentations about nanotechnology equipment development - Industrial expert from Raith, Germany

Kirchner, Martin: "Instrumentation and processing with electron and ion beam lithography"

10.30-10.50 Coffee break

10:50-11:30 Applications of nanotechnology - Young East European scientist

Bonyár, Attila: "Enhancing Biosensors with Nanotechnology"

11:30-12:00 Presentations about current research results – Presentation of local scientists

Bogdanowicz, Robert: „Deposition of nanocrystalline boron-doped diamond onto epitaxial GaN films for high power electronic and optoelectronic devices"

12:00-12:20 Problem solving discussion

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3rd Day Program: 25th September, 2014 Course site: Dept. of Electr. and Com. Systems, PRZ, Rzeszów

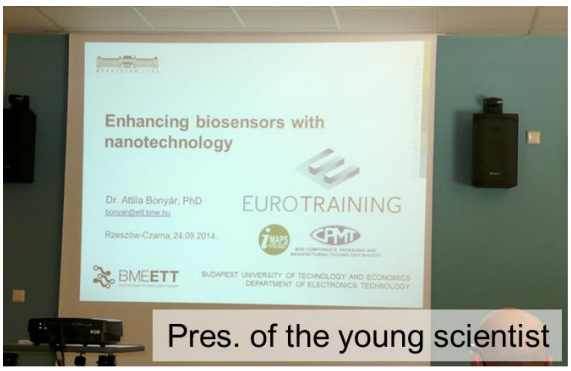
9:00-9:40 Presentations about current research results – Presentation of local scientists

Tomaszewski, Grzegorz: „Investigation of ink spreading on various substrates in inkjet technology"

9.40-11.10 Practical demonstration and laboratory visit – Visit to the laboratories of the Department of Electronic and Communication Systems, Politechnika Rzeszowska, Rzeszów, Poland

11.10-11.30 Farewell coffee with discussion and course evaluation

Some photos about the course in Czarna and Rzeszów are presented below:



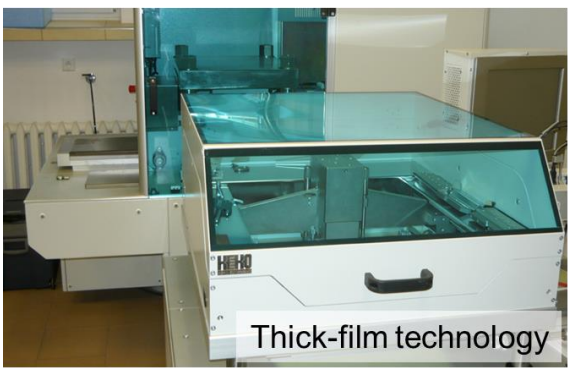
Pres. of the young scientist


The audience



Local scientist


Lab visit

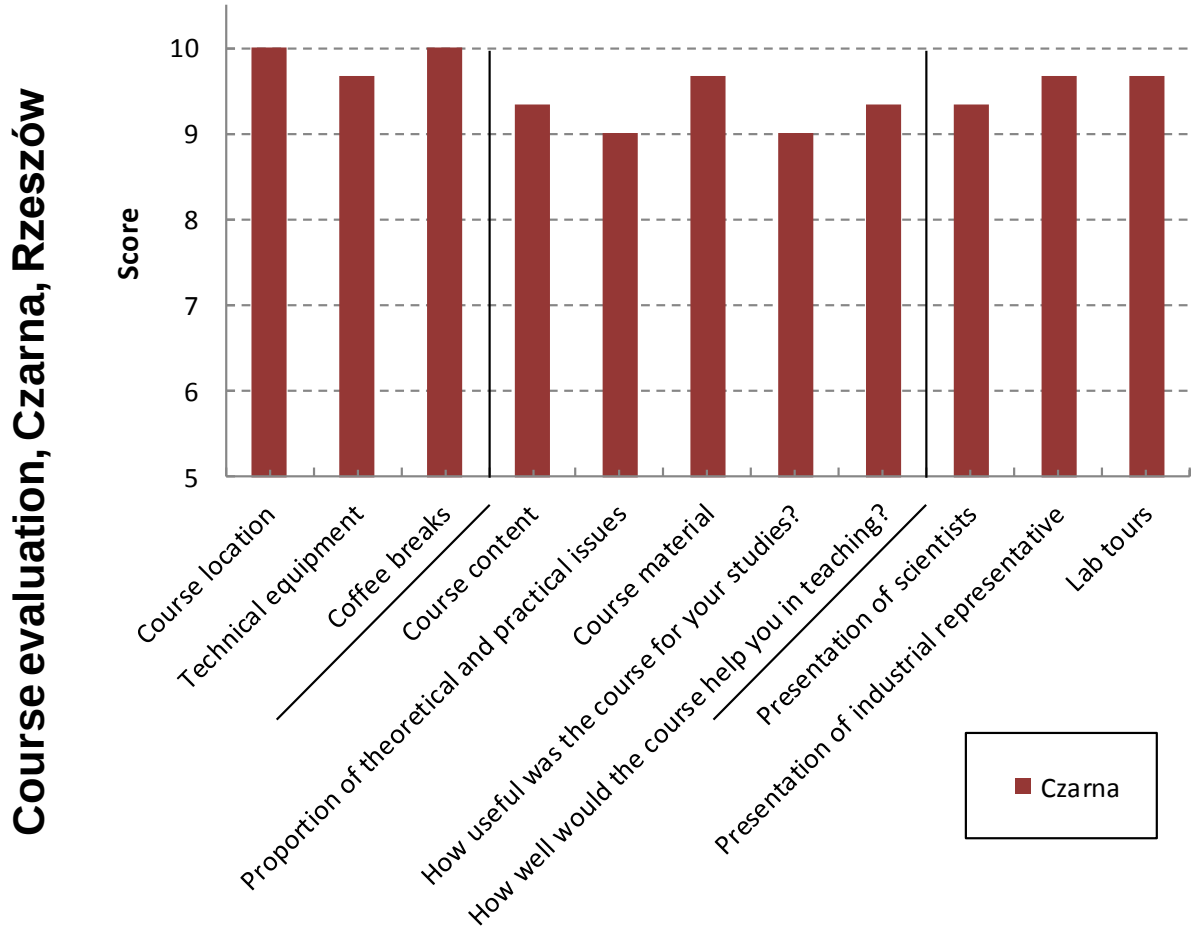

Thick-film technology



Laser patterning

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The evaluation of the course is can be found in the following plot. The course obtained very good scores between 9 and 10:



The programme of the 6th course in Kosice was as follows.

1st Day Program: 25th September, 2014 – Course site: Department of Technologies in Electronics, TU Kosice

16.00-16.10	Introduction
16.10-16.50	Nanotechnology – novel devices, applications and trends - Presentation of an invited renowned scientist *János Mizsei: „Electronics, microelectronics, nanoelectronics, …"*
16.50-17.30	Nanoelectronics – novel applications - Presentation of an invited renowned scientist *Martin Kmec: „M-Sequence based UWB sensing systems"*
17.30-17.40	Coffee break
17:40-18:20	Presentations about nanotechnology equipment development - Industrial expert from Raith, Germany *Martin Kirchner: "Instrumentation and processing with electron and ion beam lithography"*
18.20-19.00	Applications of nanotechnology - Young East European scientist *Attila Bonyár: "Enhancing Biosensors with Nanotechnology"*

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2nd Day Program: 26th September 2014 – Course site: Department of Technologies in Electronics, TU Kosice

09.00-9:40	Presentations about current research results - Presentation of a local renowned scientist *Alena Pietrikova: "Reliability aspects of lead-free solders applied in electronics"*
9:40-10:20	Presentations about current research results - Presentation of an invited senior scientist *Aleksandar Menićanin: „Inkjet Printed Layers with Nanoparticle Silver on Polyimide Substrate - CPW Inductors"*
10.40-11.20	Presentations about current research results - Presentation of an invited young scientist *Djordjije Tripkovic: „Preparation of BaTiO3 sols suitable for thin films fabrication using inkjet printing process"*
11.20-12.00	Presentations about current research results - Presentation of a local senior scientist *Ľubomír Livovský: „PCB design with embedded resistors"*
12.00-12.30	Problem solving discussion – with the participation of the invited and local scientists and the EuroTraining delegates.
12:30-13:30	Lunch break
13:30-14:00	Current research results, running projects and future plans – free discussion of all participants with the research staff of the Department of Technologies in Electronics
14.00-14.45	Practical demonstration and laboratory visit – Presentation of the virtual and research labs. of the Dept.
14.45-15.00	Farewell coffee with discussion and course evaluation
15.00	Disperse

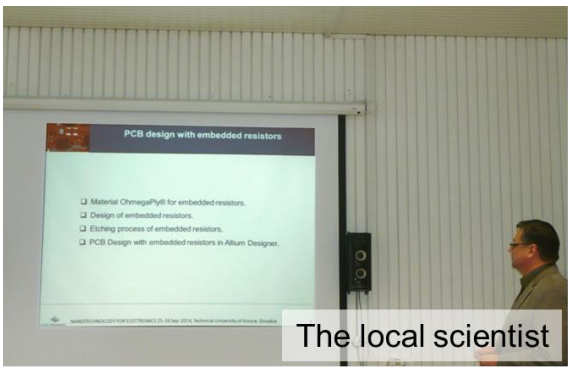
Some photos about the course in Kosice are presented below:



The renowned scientist



The industrial expert

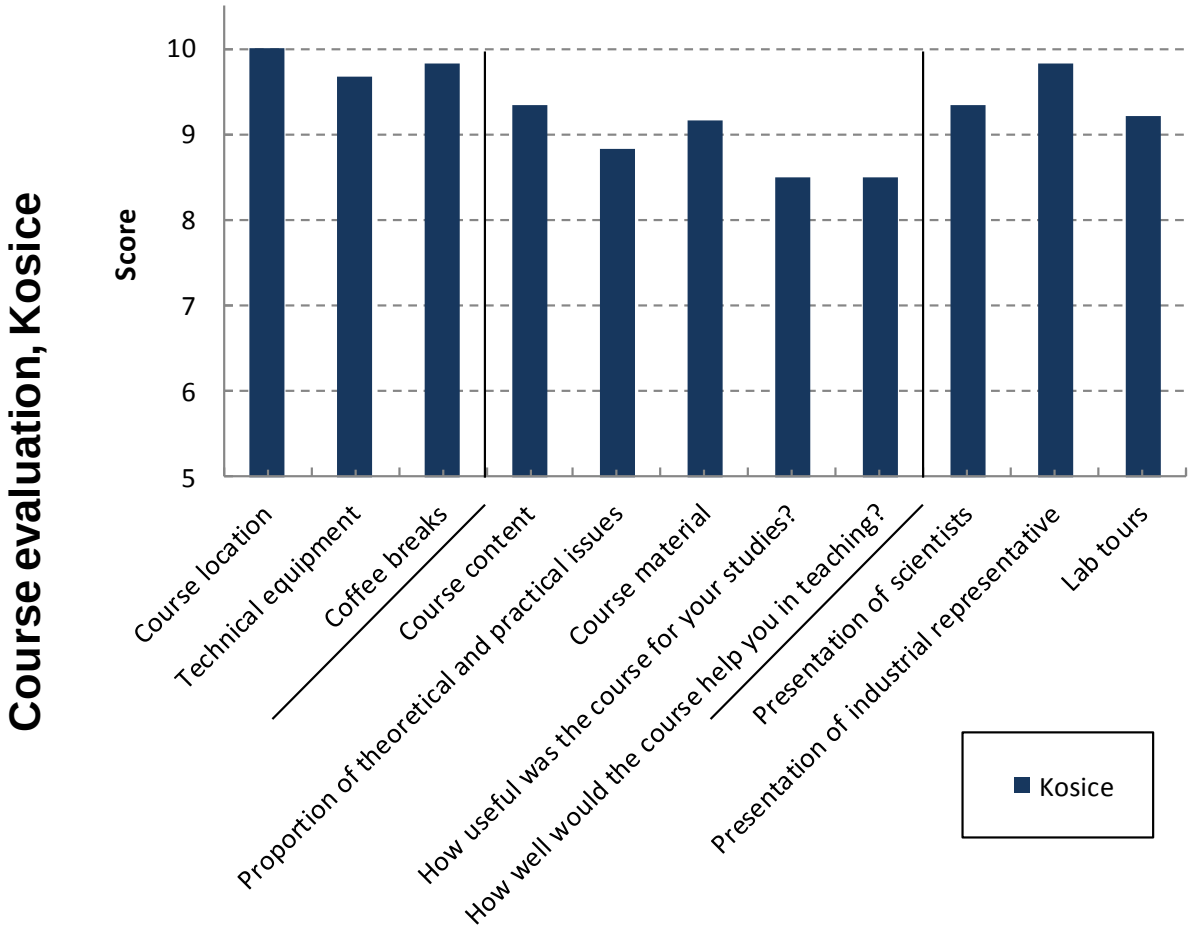


The local scientist


The audience

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The evaluation of the course is can be found in the following plot. The course obtained very good scores between 8.5 and 10:



Links for the 5th and 6th Train-the-Trainer courses:

T-t-T Flyer Czarna-Rzeszow, Poland, 23 - 25 September 2014;
http://www.eurotraining.net/pdf/EuroTraining_Flyer_Czarna-Rzeszow_2014Sep23-25.pdf

T-t-T Course Program Czarna-Rzeszow, Poland, 23 - 25 September 2014;
http://www.eurotraining.net/pdf/EuroTraining_Course_Program_Czarna_Rzeszow_2014Sep23_25.pdf

T-t-T Flyer Kosice, Slovakia, 25 - 26 September 2014;
http://www.eurotraining.net/pdf/EuroTraining_Flyer_Kosice_2014Sep25-26.pdf

T-t-T Course Program Kosice, Slovakia, 25 - 26 September 2014;
http://www.eurotraining.net/pdf/EuroTraining_Course_Program_Kosice_2014Sep25-26.pdf

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4.7. 7th and 8th Train-the-Trainer courses

The 7th and 8th T-t-T courses were at the CEITEC Brno University of Technology (24–25th March, 2015) and at the Warsaw University of Technology, Faculty of Mechatronics, Institute of Metrology and Biomedical Engineering (26–27th March, 2015). In Brno, besides the presentations of scientists, the practical demonstration is focused in the field of synthetizing and characterising nanoscale features for nanoelectronics. In Warsaw, the Laboratory of Vacuum Deposition of Thin Films, the Laboratory of Chemical and Thermal Processing, the Laboratory of Photolithography and the Laboratory of Inspection and Testing have been visited.

The programme of the 7th course in Brno was:

1st Day Program: 24th March, 2015 Course site: CEITEC, Brno

14:00-14:10	Introduction
14:10-15:00	Nanotechnology – novel devices, applications and trends – Presentation of an invited renowned scientist *Mizsei, János: „Electronics, microeletronics, nanoelectronics"*
15:00-15:50	Presentations about current research results – Presentation of invited renowned scientists *Pavel Neužil: „MEMS technology and applications"*
15:50-16:10	Coffee break
16:10-17:10	Presentations about nanotechnology equipment development - Industrial expert from Raith, Germany *Kirchner, Martin: "Instrumentation and processing with electron and ion beam lithography"*
17:10-17:50	Applications of nanotechnology - Young East European scientist *Bonyár, Attila: "Enhancing Biosensors with Nanotechnology"*

2nd Day Program: 25th March, 2015 Course site: CEITEC, Brno

09:00-10:20	Presentations about current research results – Presentation of local scientists *Michal Urbánek: „Controlling spin vortex states in magnetic nanodisks by magnetic field pulses"* *Martin Vala: „Organic Electronics and Photonics: Applications and Materials"*
10:20-10:40	Coffee break
10:40-12:00	Presentations about current research results – Presentation of local scientists *Jiří Šmarhák: „Computer simulation of nanostructures"* *Petr Klenovský: „Controlling properties of the semiconductor quantum dots for their usage in the information technology"*
13:00-13:30	Introduction to the laboratory visit *David Skoda - Head of Core Facility and Centre of Laboratories*
13:30-16:00	Visit to the CEITEC BUT core facilities – Practical demonstration and laboratory visit Clean room at Faculty of Mechanical Engineering, Technická 2, 616 00 Brno Laboratory of research group Smart Nanodevices, Technická 2, 616 00 Brno Clean room and laboratories at Faculty of Science, Masaryk University Kotlářská 9, 602 00 Brno
16:00-16:30	Farewell coffee with discussion and course evaluation The lecture room will be opened from 15.30. The attendance can use it up to their arrival from the laboratory visits.

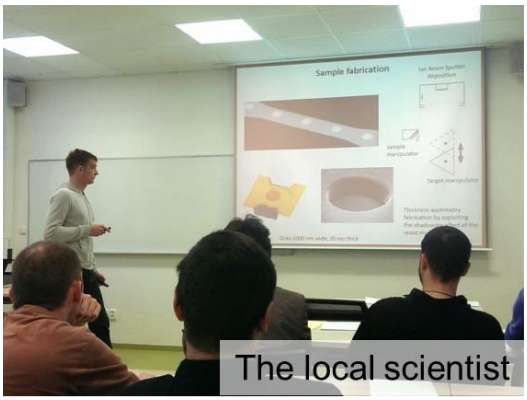
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Some photos about the course in Brno are presented below:

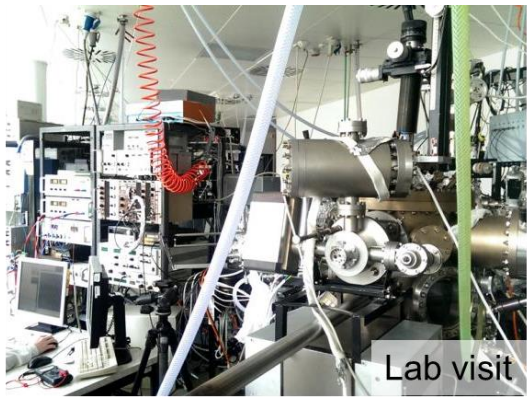

The participants



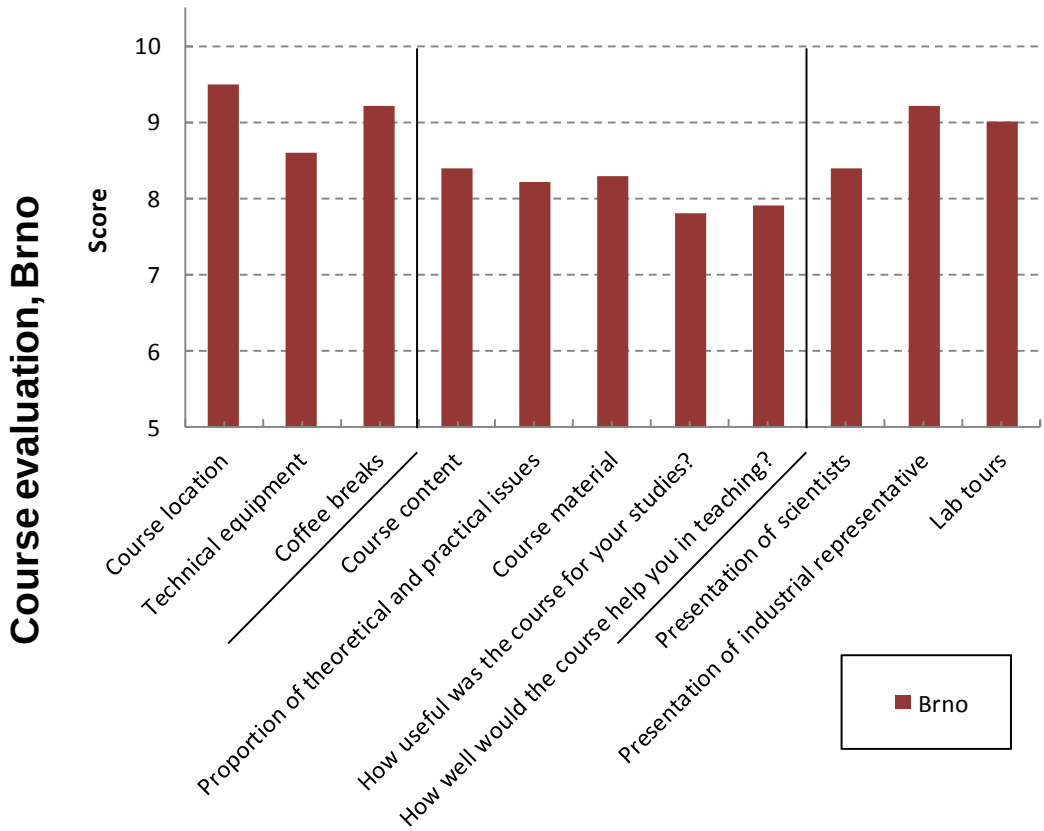
The renowned scientist



The local scientist


Lab visit

The evaluation of the course is can be found in the following plot. The course obtained very good scores between 7.8 and 9.5:



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The programme of the 8th course in Warsaw was:

1st Day Program: 26th March, 2015 – Course site: Institute of Metrology and Biomedical Engineering, WUT

08:30-08:40	Introduction
08:40-09:40	Nanotechnology – novel devices, applications and trends - Presentation of an invited renowned scientist *János Mizsei: „Electronics, microelectronics, nanoelectronics, …"*
09:40-10:40	Marcin Słoma: „Nanoscale materials for large-scale electronics"
10:40-11:00	Coffee break
11:00-12:00	Presentations about nanotechnology equipment development - Industrial expert from Raith, Germany *Martin Kirchner: "Instrumentation and processing with electron and ion beam lithography"*
12:00-12:40	Applications of nanotechnology - Young East European scientist *Attila Bonyár: "Enhancing Biosensors with Nanotechnology"*
12:40-13:40	Lunch break
13:40-14:40	Presentations about current research results - Presentation of local young scientist *Grzegorz Wróblewsk: „Carbon nanomaterials in flexible and transparent applications"*
14:40-15:20	Presentations about current research results - Presentation of local senior scientist *Konrad Kiełbasiński: „Nanosilver Sintered Joints on Rigid and Flexible Substrates"*
15:20-15:30	Problem solving discussion

2nd Day Program: 27th March, 2015 – Course site: Institute of Electron Technology, Warsaw, Poland

09:00-09:30	Presentations about current research results - Presentation of local young scientist *Marek Ekielski: „Nanoimprint lithography"*
09:30-10:00	Presentations about current research results - Presentation of local scientist *Marcin Juchniewicz: „Current research results – introduction to the laboratory visit"*
10:00-12:00	Visit to the Nanotechnology Laboratory of the Institute of Electron Technology – Practical demonstration and laboratory visit The Laboratory of Vacuum Deposition of Thin Films The Laboratory of Photolithography
12:00-12:10	Evaluation and dispersion

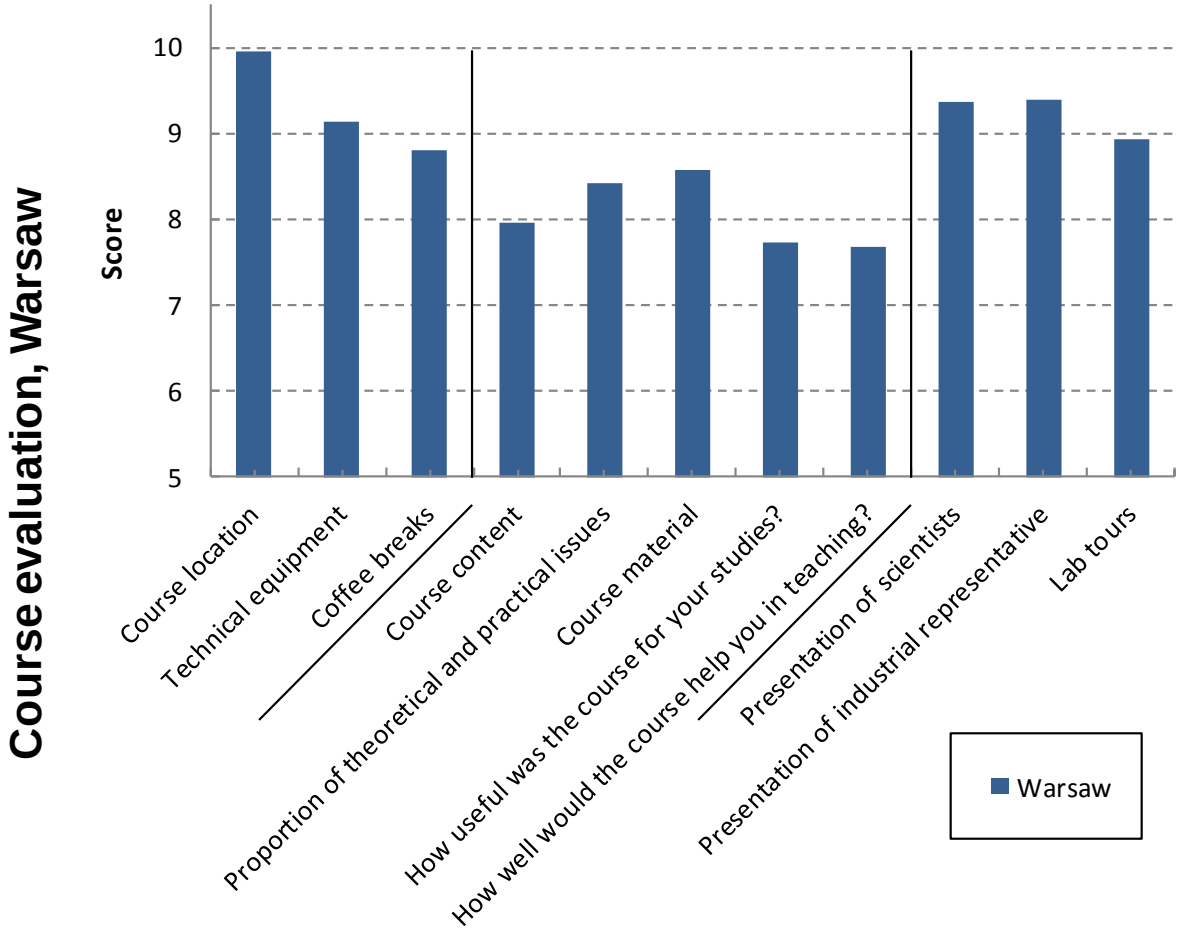
Some photos about the course in Warsaw are presented below:


The participants


Lab visit

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The evaluation of the course is can be found in the following plot. The course obtained very good scores between 7.8 and 10:



Links for the 7th and 8th Train-the-Trainer courses:

T-t-T Flyer Brno 24-25 March 2015;
http://www.eurotraining.net/pdf/EuroTraining_Flyer_Brno_2015March24-25_v05.pdf

T-t-T Course Program Brno 24-25 March 2015;
http://www.eurotraining.net/pdf/EuroTraining_Course_Program_Brno_2015March24-25_final.pdf

T-t-T Flyer Warsaw 26-27 March 2015;
http://www.eurotraining.net/pdf/EuroTraining_Flyer_Warsaw_2015March26-27_v4.pdf

T-t-T Course Program Warsaw 26-27 March 2015;
http://www.eurotraining.net/pdf/EuroTraining_Course_Program_Warsaw_2015March26_27_v5.pdf

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4.8. The 9th Train-the-Trainer course

Due to the great success of the previous courses, organisation of an additional course was determined. The 9th EuroTraining Train-the-Trainers "Nanotechnology for Electronics" course was organized in the frame of the ISSE2015 Seminar (6–10th May, 2015). Relevant presentations were selected and included into the Thursday program to form an interesting course.

The programme of the 9th course in Eger was:

1st Day Program: 7th May, 2015 – Course site: Egerszalók, hosted by BME-ETT

08:45-09:00	Opening
09:00-10:30	Oral Session 1
	Karlheinz Bock: "Heterointegration of Multifunctional Systems"
	Csaba Szabó: "Advanced Automotive Electronics Development at Bosch Engineering Center Budapest"
	Andrzej Dziedzic: "Low-Temperature Properties of Capacitors Embedded into Printed Circuit Boards"
	Arne Neiser: "Placement of Embedded Temperature Sensors in a Printed Circuit Board for a Manufacturing"
10:30-11:00	Coffee break
11:00-13:00	Oral session 2
	James E. Morris: "Nanomanufacturing R&D for Electronics Packaging"
	József Gyulai: "More than Moore, how much more?"
	Goran Miskovic: "Grain Size and Porosity Dependence of Titanium Dioxide Nano-paste on Sintering Temperature for Gas Sensing Application"
	Ievgen Kharabet: "Study of Carbon-Fiber-Reinforced Polymers Conductivity's Dependence on a Mechanical Strain"
	Beatrice Miccoli: "Interface of a Single ZnO-Nanowire Assembled onto Custom-Fabricated Nanogap Device for UV Sensing Applications"
13:00-14:00	Lunch
14:00-16:00	Oral session 3
	János Mizsei: "Electronics, Microelectronics, Nanoelectronics…"
	Hervé Fanet: "Energy Efficient Nanoelectronics"
	Éva Jelinek: "Thermal-Electronic Devices and Thermal-Electronic Logic Circuits (TELC)"
	Jiri Navratil: "Perspective Methods of Creating Conductive Paths by Aerosol Jet Printing Technology"
	Thomas Reitberger: "Aerosol Jet® Printing of Optical Waveguides"
16:00-16:15	Coffee break
16:15-18:00	Poster session 1 – selected posters in the field of nanotechnology
	J. Stulik: "Carbon Nanotube Dispersion Preparation and Deposition of Thin Layers for Gas Sensors"
	B. Illés: "Relation between Tin Whiskering Ability Sn/Ag/Cu Solder Alloys and Current Load"
	B. Medgyes: "Corrosion investigations on Lead-Free Micro-alloyed Solder Alloys used in Electronics"
	E. Ceuca: "The Smart City - Integrated green energy system"
	M. Franz: "Environmental Aspects of LED–Lighting Systems: Functional Units and Colour Conversion Materials"
	P. Lukacs: "UWB Antenna Based on Nanoparticles of Silver on Polyimide Substrate"
	Č. Žlebič: "Electrical Properties of Inkjet Printed Graphene Patterns on PET-based Substrate"
	A. Bonyár: "Enhancing Plasmonic Biosensors with Nanotechnology"

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J. Kámán: “Investigation of Surface Mechanical Properties of the Copper-Solder Interface by Atomic Force Microscopy”

T. Blecha: “Measurement System for Sensitive Layers of Carbon Nanotubes”

N. Nenov: “Examination and Development of Specialized Force Sensor”

L. Niţă: “Software for a Bidirectional Communication System for Neuromotor Disabled Patients”

R.G. Bozomitu: “Pupil Centre Coordinates Detection Using the Circular Hough Transform Technique”

M. Marinov: “Improvement of NDIR Carbon Dioxide Sensor Accuracy”

M. Kisic: “Flexible Inkjet Printed Sensor for Liquid Level Monitoring”

N. Blaž: “Displacement Sensor Based on Interdigital Capacitor”

J. Somer: “Development of Optical Inclinometer in LTCC Technology”

C. Rotariu: “A Wireless Sensor Network for Remote Monitoring of Bioimpedance”

A. Damilano: “A Flexible Resistive Read-Out Circuit Suitable to Multi-purpose ZnO Nanostructured Transducers for Robotic Applications”

C. Ionescu: “A SPICE Model for Electroluminescent Foils”

Some photos about the course in Eger are presented below:


The young scientist

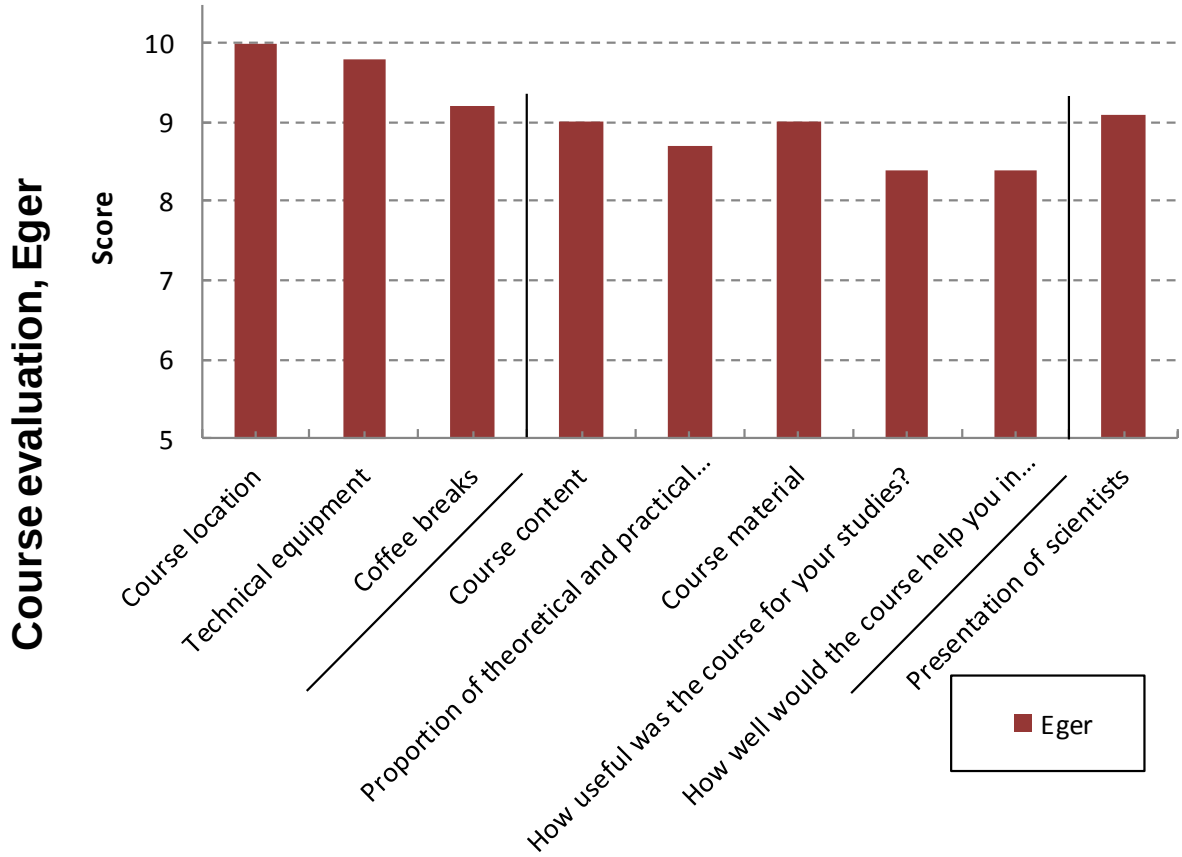

The renowned scientist


The audience


The audience

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The evaluation of the course is can be found in the following plot. The course obtained very good scores between 8.3 and 10:



Links for the 9th Train-the-Trainer course:

T-t-T Flyer Eger 6-10 May 2015;
http://www.eurotraining.net/pdf/EuroTraining_Flyer_Eger_2015May6_10.pdf

T-t-T Course Program Eger 6-10 May 2015;
http://www.eurotraining.net/pdf/EuroTraining_Course_Program_Eger_2015May6_10_v1.pdf

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4.9. Testimonial

EuroTraining supporting the higher education in Eastern Europe

Over the years EuroTraining has offered more than 20 Train-the-Trainers courses in Eastern Europe from Warsaw in north to Sofia in south. The aim of this training is to transfer training experience from leading European universities to the professors, PhDs and postdocs who will form the next generation curricula at Eastern European universities. A total of more than 600 potential faculty members have achieved training and received training material in the most advanced subjects of micro-/nano technologies.

Some of the Chairs of the organizing universities honoured the Train-the-Trainers courses by sharing their valuable opinions with us, as follows:

(http://www.eurotraining.net/pdf/Testimonial_TtT_courses.pdf)

Prof. Paul Svasta, Politehnica University of Bucharest:

At the EuroTraining course our students and young scientists got acquainted with the trends in micro- and nanoelectronics and gained also insight into the possibilities and efforts at our university. At the same time, thanks to Euro Training courses, numerous students from several technical universities in Romania had the opportunity to improve their technical knowledge.

Prof. Dan Pitica, Technical University of Cluj-Napoca:

It was very interesting for our students of the electronics department to listen to the nanotechnology presentation of an industrial expert and then to see it in practice in the laboratories of our sister department.

Mr. Cosmin Moisa, Group Leader for Electronics Development at Continental Timisoara:

It was our pleasure to accept the visit of nearly hundred students, academics and engineers to our high tech automotive electronics design centre and the unique, world-class, and very well-equipped life-time test facilities. The seminars held for our engineers and university researchers have brought us closer to the nonautomotive environment and prepared us for upcoming technologies.

Prof. Mirjana Damnjanović, Centre for Integrated Microsystems and Components, University of Novi Sad:

The seminar type organization of the Train-the-Trainers course provided a good opportunity for our young and senior scientists to present their research results and have a live discussion with renowned foreign professors and industrial experts.

Prof. Jerzy Potencki, Head of Department of Electronic and Communication Systems, Rzeszów University of Technology:

The inclusion of the EuroTraining course into the program of the IMAPS Poland conference brought the expected benefits for both events. It was gratifying to see the large number of Polish and foreign contributors with nanoelectronics and nanotechnology topics, as well as, the great interest for our new nanotechnology laboratories in the Rzeszów campus. I would like to express my personal thanks for the excellent cooperation on the line Rzeszów-Budapest during the organization.

Prof. Alena Pietrikova, Technical University of Košice:

On behalf of the Slovak group, I would like to thank for having brought and managed the EuroTraining course in Kosice. We appreciated the contributions of young scientists from the surrounding countries, from Germany, Hungary, and Serbia, which – together with the Slovak presentations – provided nice experiences for our young people. We would be happy, if it initiated further cooperation.

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