IKASIA TECHNOLOGIES

UNIVERSITAT POLITÈCNICA DE VALÈNCIA

SOMATICA MATERIALS & SOLUTIONS

Universidade do Minho

CHARLES UNIVERSITY

1 ο ΕΠΑΓΓΕΛΜΑΤΙΚΟ ΛΥΚΕΙΟ ΚΑΤΩ ΑΧΑΪΑΣ

TEI of Crete
Technological Educational Institute of Crete

Co-funded by the Erasmus+ Programme of the European Union

EDUCATIVE PROGRAM

TO CREATE A NETWORKOF TRANSVERSAL AND INTERNATIONAL INTERNSHIPS IN TECHNOLOGICAL SECTOR

INTRODUCTION

WHERE THE IDEA COMES FROM

In Europe there have been three basic vocational training models, on which current systems have been shaping (Great Britain, France and Germany). These models are based on the will to provide citizens with specific productive processes rather than theoretical ones . However, this educational process poses problems for VET students when they want to continue to higher education (university) due to the methodological differences between the two educational levels or when they want to participate in very demanding work environments where an error can lead to serious delays in the achievement of the objectives.

Given this situation, we have implemented a high performance internship system for students of middle vocational training courses in a network of Technology-Based Research Centers and Companies. This internship system allows a significant increase in the employability of participating students by providing them with a fundamental experience in the highly demanding work environment and enhancing the value of their curriculum. It also arouses the interest of these young people to access higher education. All this thanks to a TRAINING PROGRAM IN HIGH TECHNOLOGY CENTERS (FCT) that will develop scientific and educational competencies by improving the training of VET for work.

INTRODUCTION

WHERE THE IDEA COMES FROM

This internship system involves a network of high-technology research centers. A very innovative methodology is applied. It has been created specifically for this purpose, based on collaborative work and immersion of students in professional training internships in very innovative environments: research groups of scientific or technological excellence and technology-based companies.

The essential teaching methodology in these internships is based on critical thinking and overcoming obstacles. It is about showing students that progress in knowledge and technology is associated with a critical spirit, which calls into question any argument or explanation of an observed phenomenon, regardless from whom it comes, until one finds a satisfactory explanation through shared effort.

This type of training will be acquired by participating in proven innovative work groups and leading research projects such as the construction of new 3D printing systems, bone regeneration projects, development of bio hybrids for the indirect co-culture of cells, creation of smart materials...

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Objectives

Mobilities are more than a period of isolated internships in research centers and technology-based companies but are also subject to a PROGRAM FOR TRAINING IN HIGH TECHNOLOGY CENTERS (FCT) common to all network internships.

This program aims to encourage students to exceed their limits and don't put a stop to their educational expectations, creating in them the interest to go beyond their studies or get involved in leading research centers.

To this end, it has been created an innovative methodology that structures the system of internships in the R&D centers attached to this network and allows, through practical training for reference projects in Europe, to develop learning systems that combine the necessary practical and theoretical learning for their future work, but also for their path to higher education (whether Higher Vocational Training or University).

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Critical thinking

The essential teaching tool for training (practical and theoretical) is critical thinking and the overcoming of obstacles through collaborative work that will promote the cooperation among the students involved in internships in the network. It is intended to show students that the advance in knowledge and technology is associated with a critical spirit, which calls into question any argument or explanation of an observed phenomenon, regardless from whom comes, until one does not find a satisfactory explanation. Through the shared effort .

We want to promote the use of student knowledge and intelligence to effectively reach the true, useful and justified solution to a problem.

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Methodology (1)

The training in critical thinking of the VET student during their internship in a company must be a continuous process in which the interaction with the work team in which the student is immersed will play a relevant role. An environment in which people are critical with their own way of thinking, with their decision-making procedures, reaching conclusions and solving problems will be the main source of student training. However, one cannot trust that only immersion in a work team is sufficient for the training of a student. The development of certain critical thinking abilities will require specific strategies adapted to each person.

In relation to this, the preparation of the student's work plan in the company can be one of the keys. The definition of the student's activity in the company must obviously take into account the interest of the company, the student's work must contribute effectively to the production or research and development objectives of the company. However, in order to be a training activity and especially to be formative in relation to critical thinking, the work plan must be thought of relating its methodologies and selection of tasks with the critical thinking capabilities we want to develop.

Methodology (2)

To this end, work methods have been established based on two lines:

- **ACTIVE PARTICIPATION IN THE DEVELOPMENT OF STATE-OF-THE ART PROJECTS:** This type of training is to be acquired by participating in proven innovative working teams and in a joint research project. As a proof of concept, this project is about the development of new smart materials. The students involved in the project during their internship in the research and development centers will participate in the research tasks, under the supervision of experienced researchers and may participate in the publications that arise from them in the way their tutors deem.

- **COLLABORATIVE WORK**: all students working in the different centers will form a discussion group using the ICTs in which they will have to reach conclusions about the results obtained in the different laboratories that will be necessary to meet the expectations of the internships. The objective is not only to learn group work strategies through international networks, but to generate the spirit of solidarity and collaboration among students who suffer from various barriers.

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Methodology (3)

All this will allow:

- The practical development of functions and work processes distinctive to the Curricular Programming of their Middle Degree Formative Cycle.

- The theoretical development of specific knowledge and skills in the field of research. All this through methods based on self-discovery and the active search for information.For it, vicarious learning techniques and self-discovery processes based on equity and mixed work will be used.

- Finally, a non-formal and informal education based on a non-systematized process will also be applied, in which students acquire and accumulate knowledge, abilities and attitudes from daily experiences and their inclusion in a different environment with another culture that welcomes them in their day to day during mobility.

EDUCATIVE PROGRAM

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Language learning

The beneficiaries of the program will have language support before leaving or during the mobility activity. In this regard, the Commission offers an online service for certain VET beneficiaries, with a view to assessing their proficiency in the language they will use to carry out practical training periods abroad.

If necessary, this service also offers them the possibility to improve their knowledge of the language before and during the mobility period . Participants with a minimum level of B2 in the main working language may take an OLS course in the language of the host country, if available. This online service will be gradually implemented in the course of the program.

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Training materials

The process of training students during mobility, but also during the previous phases will be based on three fundamental materials:

- Specific scientific supporting materials for each of the projects proposed by the research centers and technology-based companies for the internships.
- **METHODOLOGICAL GUIDE TO QUALITY AND INNOVATION IN VET THROUGH INTERSECTORIAL COOPERATION.** It will be a methodological guide of recommendations for the collaboration of companies and higher education entities with VET centers that allows implementing an innovative methodology, adapted to Middle cycles, in order to improve the quality of training, the promotion of these students in higher VET cycles or university studies and enhance their inclusion in the labor market.
- **GUIDE FOR TRAINING IN HIGH TECHNOLOGY WORK CENTERS (FCT).** A training guide where all the aspects necessary for obtaining high quality results in the field of vocational training or VET in leading research centers are specified.

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GENERAL FEATURES

FEATURES, RIGHTS AND RESPONSABILITIES OF AN INTERNSHIP

PHASES OF THE MOBILITY OF STUDENTS IN PRACTICE

The students included in this internship system will go through three phases:

-PHASE 1.- A previous course for training in Technology-Based Research Centers and Companies that will show them where they are going to do the internship, will enable them to perform the functions expected from them, will reduce the time of adaptation to the new post and will develop in them the critical and scientific thinking.

-PHASE 2.- Realization of stays in Research Centers and Technology-Based Companies where they will participate in proven work groups and research projects where they must learn to collaborate with professionals from various sectors to meet the set objectives.

During their internship time they should not only put into practice what they learned during the cycle, but also seek information and develop their knowledge in complex subjects thanks to the tutoring of internationally renowned scientists; especially actively participating in the processes of evaluation, definition of functions and obtaining results.

-PHASE 3.- Final process of self-evaluation and conclusions of the practice. During the same period, students will self-assess the skills developed and the new skills achieved. Once this is done, they will share their own evaluation of results with that done by their tutor and teachers and the labor certificate will be issued.

We believe that the involvement of these students in very attractive high-tech projects will encourage them to overcome their limitations and allow them to gain extensive practical experience and significant curriculum improvement at the end of their mid-cycle studies.

GENERAL FEATURES

EDUCATIVE PROGRAM

GENERAL FEATURES

EDUCATIVE PROGRAM

REQUIREMENTS FOR THE STUDENT´S INTERNSHIP

From IKASIA TECHNOLOGIES´ perspective we consider that these internships in companies, in the vast majority of cases the first work experience of VET students, they must not only develop their work skills and critical thinking, but the internship must be a first real insertion in the market of work that allows them to experience full emancipation.

That is why the practices of VET students will be subject to:

- The VET student must make a clearly defined working day committing during the work schedule to strive and take responsibility for the tasks in charge which must be consistent with their degree and be within their reach.

- The student will receive some pocket money, equatable with a fair salary for his working day that will be in any case equal to the minimum salary of the host country. In addition to the salary, the student will receive free accommodation with high quality standards.

- The student will have mobility costs included in the first trip to the workplace, as well as the last trip back to their country of origin.

- The student will have an IKASIA TECHNOLOGIES tutor who will advise and assist the student in their stay in the country of destination, as well as a tutor in the company that will help and supervise their work in the workplace.

- The student will benefit from the work calendar established for the host company.

- The student must attend the previous training course, as well as collaborate in additional training activities (final evaluation, collaborative sessions between internship students, language training).

GENERAL FEATURES

EDUCATIVE PROGRAM

CHARACTERISTICS OF THE MOBILITIES

- **Duration of mobility**: 3 months.

- **Pocket money:** The pocket money received by the mobility participant will be equal to the minimum wage of the host country with a maximum of € 750 / month.

- **Workday**: The stipulated by the educational program, by the E + Program and if not by the host company.

- **Accommodation**: The cost of accommodation will be included in the mobility and will be clearly defined in each of them:
  - **An apartment** shared only by mobility participants in that city in order to generate complicity between them and an emancipatory experience.
  - A **student residence** known by the host entity.
  - **An accommodation** endorsed by the University or host company.

- **Travel**: Each participant will be assigned the amount defined by the Erasmus Plus Program in order to finance the one-way trip to the host country and the last return trip to the sending country.

- **Other services**: Support service for each participant and personalized supervision during time abroad. Language training and training to develop functions in positions of research centers and technology-based companies.

- **Evaluation:** Each mobility will be evaluated by the tutor of the host company, as well as by the person in charge of IKASIA TECHNOLOGIES. These will make a report that will be sent to the VET sending center teacher. If positive, a certificate will be issued for the participant of the “Critical Thincking as a step forward in vet education” network.

CENTER NETWORK

CHARACTERISTICS OF THE NETWORK OF RESEARCH CENTERS AND EBTS

CENTERS NETWORK

CHARACTERISTICS OF THE NETWORK OF RESEARCH CENTERS AND EBTS

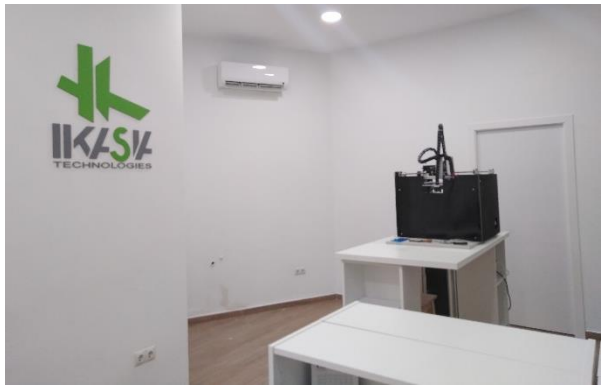
IKASIA TECHNOLOGIES SL (SPAIN)

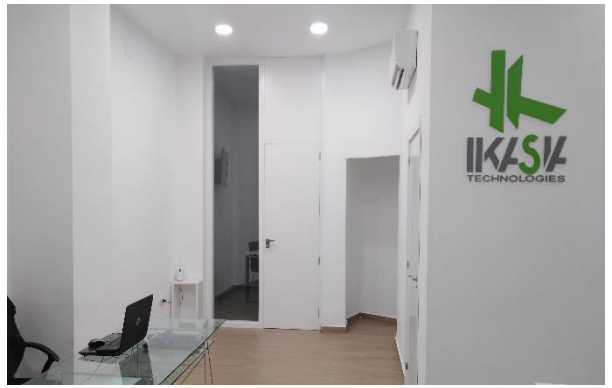
Ikasia Technologies is a technology-based company whose objective is the generation and use of new technologies for the implementation, manufacturing and / or commercialization of new products, processes or services in diverse fields, specifically 3D, additive manufacturing, composites and biomaterials.

IKASIA Technologies seeks to put on the market a new generation of non-metallic micro and nano-structured hybrid materials, more flexible and resistant than steel, for special environments, produced by a patented cold process of 3D printing. In addition to the commercialization of a new additive manufacturing system and the production of series of parts on request, the group of professionals that Ikasia Technologies forms offers an advisory service and development of high-tech projects.

Among the projects in which it participates we can cite:

- E + critical thinking as a step forward in vet education: educational project for the inclusion of VET students in research centers and technology-based companies. The objective is not only to generate both the development of skills among VET students, and more possibilities to work in high-tech centers, but we also want to show these centers the capabilities and virtues of these students, and promote a methodology that promotes inclusion and learning in these entities. To do this, we propose a methodology based on encouraging critical thinking and overcoming problems through collaborative work.
- Tissue engineering for bone augmentation for dental implant fixation:
- Ideal 2 global: development of implants for the regeneration of joint cartilage.





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CENTERS NETWORK

CHARACTERISTICS OF THE NETWORK OF RESEARCH CENTERS AND EBTS

CENTER FOR BIOMATERIALS AND TISSUE ENGINEERING - UPV (SPAIN)

Universidad Politècnica de València

The Universitat Politècnica de València (UPV) is a public institution dedicated to research and training. Currently, the UPV is made up of thirteen university centers that include higher technical schools and faculties, as well as a doctoral school.

The UPV houses more than 36,000 students and employs more than 5,000 people (teachers, researchers, administrative staff, services).

It is the first technological university in Spain according to international classifications (for example, the Ranking of Shanghai World Universities) and offers 30 undergraduate programs, 5 double undergraduate programs, 76 official master's degrees and 30 doctoral programs.

The UPV has been ranked several times among the 10 best European universities in terms of student exchange under the Erasmus Program, and has actively participated in several Erasmus Mundus Action 2 associations.

CENTERS NETWORK

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CENTER FOR BIOMATERIALS AND TISSUE ENGINEERING - UPV (SPAIN)

CBIT

The Centre for Biomaterials and Tissue Engineering (CBIT) is a research centre of the UPV aimed at research on the development, manufacturing, physical and biological characterization of biomaterials for specific applications in regenerative medicine, as well as the formation of the aforesaid area. It focuses on the advance in the knowledge of the combined use of biomaterials with cells and biochemical and physical factors in order to recover and regenerate tissues and their biological function after an injury or pathology.

The research areas of the CBIT are focused on the development of:

- Materials for regenerative medicine and tissue engineering: creation of new biodegradable and biostable materials, for implants or supports, able to provide an appropriate environment in which living cells and tissues can develop their function.
- Support for cell culture: development of materials and three-dimensional supports for cell culture manufactured with specific materials and properties, which bring in vitro results to preclinical models and in human patients, reducing the costs and development times of pharmaceutical products.
- Modified surfaces: study of the interaction of biomaterials with cells and living tissues and the mechanisms of control and modification of the surface characteristics of these materials, making use of strategies such as the control of surface topology, among others.
- Microparticles: development of new micrometric sized particles from biocompatible materials for cell culture applications and controlled drug delivery.
- Synthesis and manufacture of gels, membranes and threads for different biomedical applications.

CENTERS NETWORK

CHARACTERISTICS OF THE NETWORK OF RESEARCH CENTERS AND EBTS

HOST CITY IN SPAIN

Valencia

Valencia, a city founded by the Romans, has a great historical and cultural heritage. Not only it is highlighted the contrast of the old town (where you will find the silk market or the Micalet, among others) with the innovative and avant-garde buildings of the city of arts and sciences, but also has beautiful beaches and natural parks, such as that of the Albufera or the Turia Garden. Similarly, the Fallas, declared a World Heritage Site in 2016, stand out.

Throughout the city you can find various neighbourhoods where you can enjoy both its streets and its gastronomy and entertainment.

CENTERS NETWORK

CHARACTERISTICS OF THE NETWORK OF RESEARCH CENTERS AND EBTS

INSTITUTE OF SCIENCE AND INNOVATION FOR BIO-SUSTANTIBILITY (IB-S) – UMINHO (PORTUGAL)

Universidade do Minho

The University of Minho is a public higher education institution that is currently among the most prestigious in Portugal. It has three large campuses, two of which are located in Braga, while the third one is in Guimaraes.

Uminho is part of one of the reference universities for education, not only in Portugal, but also at European and world level. It is an example of the capacity for change, being a pioneer in several areas of education, training and research.

CENTERS NETWORK

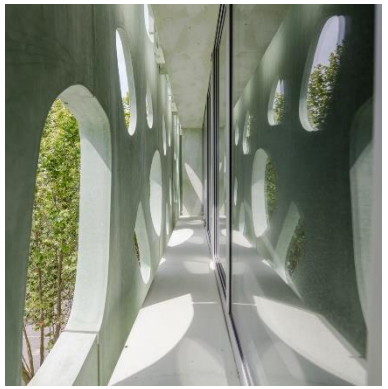
CHARACTERISTICS OF THE NETWORK OF RESEARCH CENTERS AND EBTS

INSTITUTE OF SCIENCE AND INNOVATION FOR BIO-SUSTANTIBILITY (IB-S) – UMINHO (PORTUGAL)

IB-S is an initiative that brings together a large number of researchers from many different fields of specialization, such as environmental biology, civil engineering, electronics, molecular biotechnology, materials sciences, physics and mathematics, developing a fundamental and leading research for development sustainable. IB-S was created as a joint entity between two research units of the University of Minho: CBMA (molecular and environmental biology research center) and ISISE (institute for sustainability and innovation in structural engineering).

IB-S focuses on the development of:

- New strategies for biodiversity conservation.
- New tools for biomonitoring and environmental risk assessment.
- New systems for recycling materials and waste treatment/ management.
- New processes and materials for sustainable construction.
- New eco-bio-materials and bio-inspired materials for bioconstruction.
- New materials and intelligent structures.
- New energy efficiency systems.



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HOST CITY IN PORTUGAL

Braga

Braga, the third largest city in Portugal, houses history and culture, offering a wide range of activities. In it we find monuments such as the oldest cathedral in Portugal or the Bom Jesus do Monte. The old town is completely pedestrian and consists of lovely squares and gardens, combining narrow streets with more modern and commercial streets with large baroque buildings.

Braga is a maze of narrow streets that hide places of historical interest, original monuments and traditional commerce.

CENTERS NETWORK

CHARACTERISTICS OF THE NETWORK OF RESEARCH CENTERS AND EBTS

INSTITUTE OF MACROMOLECULAR CHEMISTRY – CHARLES UNI. (CZECH REP.)

Charles University

Charles University, one of the oldest in the world, is a prestigious university of higher education and research. Not only is it the largest and most recognized university in the Czech Republic, but it is also the best qualified in the international rankings.

This university, considered one of the best in the field of research in the Czech Republic, stands out for a wide range of research projects and applied projects, in which students can participate in each of the faculties.

It collaborates with many recognized universities around the world, allowing interested students to study abroad and conduct joint international research projects. Their participation in many international organizations and prestigious university networks predominates, as well as their active support in international student mobility.

CENTERS NETWORK

CHARACTERISTICS OF THE NETWORK OF RESEARCH CENTERS AND EBTS

INSTITUTE OF MACROMOLECULAR CHEMISTRY – CHARLES UNI. (CZECH REP.)

Institute of Macromolecular Chemistry

The Institute of Macromolecular Chemistry (IMC) is a research and education center in chemistry and physics specializing in macromolecular science. One of the characteristics of BMI is the possibility of applying and combining several contemporary methods for sample preparation and characterization, including spectroscopy, microscopy, X-ray diffraction, NMR, DSC, mechanical characterization and modern analytical methods. Among the most significant practical results are the alkaline polymerization of caprolactam and the development of hydrophilic polymers.

The center is divided into the following research departments:

- **Center for supramolecular systems and self-assembly processes**: combines the capacity in the design and synthesis of polymers that exhibit self-assembly properties, with the physicochemical experience in self-assembly processes and structural characterization of supramolecular systems.
- **Center for biomacromolecular and bioanalogical systems**: covers fundamental aspects of macromolecular chemistry, physics, biotechnology, biology and medicine.
- **Center of materials and technologies of polymers**: research and development of advanced polymeric materials with heterogeneous phase structure and adapted properties.
- **Center of structure and dynamics of macromolecules**: study of various approaches for the analysis of the structure of polymers and the development of methodologies for structural studies, using physical, spectroscopic and chromatographic methods.
- **Center for optoelectronic and energy applications**: it focuses on the fields related to optical, electronic and electrical phenomena in polymers and advanced materials for energy storage or conversion.

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CENTERS NETWORK

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HOST CITY IN CZECH REPUBLIC

Prague

Known as the city of a hundred towers or the golden city, it is a city enshrouded by a marked medieval atmosphere. It is characterized by its history and entertainment, as well as its cobbled stone pavement that leads to old parks and gardens, elegant cafes, castles and medieval bridges. In addition, you will find the best places to try Czech cuisine.

There are many reasons to visit Prague, as it is considered one of the most beautiful cities in Europe and it can become a pleasant experience.