

ΠΡΟΤΑΣΗ ΣΥΝΕΡΓΑΣΙΑΣ TUC-NIT (ΙΝΔΙΑ)

A. QUALITY OF PROJECT DESIGN AND COOPERATION ARRANGEMENTS

Ερώτημα Α (Σε επίπεδο Σχεδίου/για όλες τις προτάσεις συνεργασίας με ιδρύματα, 40 βαθμοί).

TUC is an outward looking HEI, whose main aim is to provide high-quality education to students and research opportunities to staff members, driven by excellence in research, teaching and innovation, through strong ties with international organizations that give complementarity and add to the excellence standard of the entire team. In 2016, the external Higher Education Evaluation committee ranked it amongst the 10 best achieving institutions in Greece. The same year, TUC submitted a successful application at the ICM Call. In the last 27 years has signed a significant number of MoUs, more than 100 Inter-Institutional Agreements under Erasmus program and has received and sent hundreds of international distinguished academics, scholars and students to and from European and non-European Universities (Israel, Jordan, U.S.A, China, Botswana, Canada, South Africa, Armenia, Ecuador, Laos, Serbia, Chile, India, New Zealand). After the end of the inter-institutional agreements, channels of cooperation are maintained either at the level of Faculties or at the level of research working groups between the partner Institutions. For this reason, the cooperation with the majority of the Institutions continues in the plans 2019-22 and 2020-3 within the framework of the international mobility program. Although the majority of the Institutions expressed interest in continuing the collaborations under the same program, the TUC in the new mobility plan (call 2022) gave priority to collaborating with new Institutions in the same educational fields in order to expand its global cooperation network on international issues.

Preparation for the submission of the cooperation proposal: The responsible persons for the implementation of the program are predetermined **in writing**, while pre-agreed the observance of the principles and procedures, as foreseen in the inter-institutional agreement. In the preliminary cooperation agreement both Institutions have defined: Erasmus management officers for the implementation of the program (TUC: Markos Ntoukakis/Erasmus office) and Inclusion Officers (TUC: Lefteris Maragkoudakis/Erasmus office) who undertake to reach out and increase accessibility to more participants with fewer mobility opportunities. In addition, Erasmus academic Institution coordinators (TUC: Prof. Michael Zervakis/**Vice Rector**) and the legally responsables for the conclusion of the inter institutional agreement (TUC: Prof. Evangelos Diamantopoulos /Rector). Erasmus Offices of the partner Institutions communicate with e-mail, skype, cloud storage services (Dropbox) for file sharing on the needs of the project. Basic parameters of the cooperation have been regulated, such as the procedures for the information of the academic communities and the invitation ways to participation in mobility, the selection criteria for applicants and the recommendation of the evaluation committee. In addition it is identified the educational field(s) of the project, the participating faculties from each Institution, the academic coordinators from each faculty (TUC: <https://www.tuc.gr/index.php?id=12861&L=928%27>) and academic calendars are exchanged (TUC: <https://www.tuc.gr/index.php?id=3624>). Specifically for student mobility (1st, 2nd cycle) the Erasmus officers exchange information about the required language skills and the offered courses of each faculty (TUC: <https://www.tuc.gr/index.php?id=534&L=928%27>). Also, information is exchanged regarding the professors who can supervise thesis for students and for those who can contribute the activities of incoming staff, for the organizations that can employ students for traineeship and for the required language skills of incoming participants in each institution. After the mobility grant, each Erasmus officer will post announcements on the official websites and social media accounts about the procedures and benefits of the Erasmus program. The

Inclusion officers will post information about the possibilities, the criteria and the capabilities of the program for the support of vulnerable groups. At the same time, the Erasmus officers in collaboration with the academic coordinators of participating faculties of each Institution will relate the offered courses for the incoming Erasmus students. The inter-institutional agreement will then be checked by the Erasmus Institution Coordinator and be signed by the legal representative of each Institution. After the signing, the Erasmus officers and the Inclusion officers will post invitation on the media and sessions will be organized to inform the academic communities for the approved mobilities. The invitation to participate in the program for staff and students by the Erasmus officers will be composed in the pre-agreed way at the same time in both Institutions if this is possible for better control of the process. Applicant outgoing students from TUC evaluated by the motivation to participate in mobility, from their activities in the specific educational field, while priority will be given to students with fewer opportunities to participate in mobility. A point allocation system evaluate outgoing staff of TUC, based on the years of their employment at TUC, the time since the last participation in mobility and the submitted activity plan. Erasmus officer at the Partner Institution informs in writing the Erasmus office of TUC about the procedures of information, selection and evaluation of the candidates. In this way, TUC as the coordinator of the program ensures a selection process fair, transparent and documented, ensuring equal opportunities to participants eligible for mobility. Details for the pre-planning of the cooperation with each candidate Institution are given in in the corresponding section.

Before the mobility: The required arrangements in the Inter institutional Agreement to support the participants before the mobility for procedures related to visa, insurance, travel, accommodation, integration and linguistic support of students will be implemented in collaboration with the Erasmus officers and Inclusion officers of both Institutions. They are responsible to post information on the websites of their institutions about the above procedures and to provide administrative support and advice to participants. Incoming students at each Institution can receive additional information for the planning of their studies from the Erasmus academic coordinators of each faculty and from professors who specialize in the educational field of the cooperation and have stated that they can co-supervise their thesis. Incoming staff at each Institution can receive additional information from members of TUC who specialize in the same education field and have stated that they can contribute to their activities. In this way, the participants will have all the information for the planning of their activities in the mobility agreements. Incoming students to TUC can receive additional information about their stay in Chania from the Erasmus Student Network (ESN) at TUC (<https://tuc.esngreece.gr/about-us>). The Inter-institutional agreement clearly states that TUC's Erasmus office will manage the OS and will be responsible for uploading and updating the Mobility Tool. Under the terms of the Erasmus Program, students will not be required to pay any tuition fees to the host Institution. TUC, as applicant and Coordinator, will be in charge for the financial management, conforming to the guidelines and policies of the European Commission and the National Agency (IKY). All grants and travel expenses of the Erasmus+ International Credit Mobility Program participants will be covered by the TUC. The data required for the signing of the grant agreement (visa, insurance contract, bank account, tickets) will be collected and checked by the Erasmus office of TUC. The prepayment (80%) will be granted to participants at least one month before the start of mobility. The disbursement of money and their deposit in the bank accounts of the participants is a responsibility of finance department of TUC, "Special Account for Research Funding–ELKE" (<https://www.elke.tuc.gr/en/home>) in collaboration with the Erasmus office of TUC.

During the mobility: In addition to the participant support procedures mentioned in the inter-institutional agreement, upon arrival of the grantees, TUC Erasmus Office will organize a campus-tour and a meeting in order to inform the applicants regarding the city, the transportation and the campus life. TUC will offer free the student ID card and full access to classic core ICT services (e.g. e-mails account, Wi-Fi, etc), to library, in campus sports installations, at meals and in public transport at low prices. TUC's Language Research and

Resources Center contribute to the improvement of the linguistic skills of Greek students by offering free of charge lessons in English language and free lessons in Greek language to incoming students. Students and academic staff with physical disabilities have full access to all above activities and services. There are spacious elevators and parking facilities, so that all the physical barriers are eliminated and many laboratories are on the ground floor. TUC will integrate incoming students and staff by encouraging them to participate in students' associations and campus life, cultural activities and visits. The Erasmus academic coordinators of participating faculties will attend their studies in the courses provided in the learning agreements. An appointed team of Professors will co-supervise the progress of their dissertation and will also draw a final report at the end of their mobility period, in order to facilitate the recognition of the learning outcomes. Incoming students are expected to participate to presentations, seminars, conferences or other academic and scientific activities in order to diffuse the acquired and gained knowledge. Particularly important is the contribution of the Erasmus student association (ESN) for the integration of incoming students in community of TUC and in the social life of the city.

After the mobility: The original Certificate of Attendance that will be handed from the Erasmus officer of TUC will be the proof of recognition for the mobility period. Erasmus officer at the partner institution will be required to provide written recognition of the courses and postgraduate and doctoral studies (part of thesis) for TUC outgoing students. After the final check of all the presented documents, the participants will receive from ELKE the remaining 20% of the grant. After the end of mobility, participants have to submit the EU Report. The final reports in combination with the open-ended questionnaire to the participants are used to evaluate each mobility. In short, participants are asked if they have implemented the planned activities and if they are satisfied with the services (information, criteria for selecting participants, measures to support vulnerable groups) provided by Erasmus offices and academic coordinators from each institution before, during and after mobility. Every answer must be justified. The processing of the participants' reports in combination with the above questionnaire and the final evaluation of the project by the IKY are used as indicators for the evaluation of the project and are discussed in a special session of the Erasmus office contributes to the continuous improvement of the implementation of the mobility program. Participants' activities post on the Erasmus website and presented by them at an event organized by the Erasmus Office after the end of each mobility project, which is attended by the entire academic community. In this meeting, the participants discuss the benefits and potential problems that arose during the project and propose solutions to improve the planning and management of the mobility program.

B. RELEVANCE OF STRATEGY

Ερώτημα Β (Σε επίπεδο περιφέρειας/ για κάθε πρόταση συνεργασίας με συγκεκριμένο ΑΕΙ, 40 βαθμοί)

The School of Electrical and Computer Engineering of TUC and the Department of Computer Science and Engineering of National Institute of Technology (NIT) in India-Jamshedpur will participate at the proposed collaboration on the education field "Electronics and automation" (ISCED code: 0714) in the scientific area "algorithmic applications on medical image/diagnosis" for processing and understanding. The proposed plan aims to address several aspects of Digital Transformation, including the development of a digital education ecosystem in the areas of image processing and medical diagnosis, as well as in the areas of digital systems and optoelectronic devices. Furthermore, it aims to support a wide range of young people, students and researchers with less opportunities to the ecosystem of digital transformation. In particular, TUC will provide expertise in algorithms and biomedical applications, while NIT will support all the developments of electronics and optical equipment.

The National Institute of Technology (NIT) in Jamshedpur is a rather small but fast developing Institution in India, striving for excellence in research and technology development. It has the vision to provide quality technical education and to facilitate scientific and technological research, coupled with a mission to develop human potential to its zenith. The institute is committed to academic excellence and good governance. NIT was ranked overall 78th for 2015-16 among the best 100 engineering institutes in the country by the National Institutional Ranking Framework. It is fast emerging as a global knowledge center for quality research and teaching through cross-disciplinary, innovative and dynamic approaches. The curriculum is regularly updated with greater emphasis on hands on experience and also enabling students to keep abreast with the latest in scientific and technological spheres. The Institute has 12 departments including engineering, science and humanities, embracing 200 faculty and 4000 students. Currently NIT, has developed collaborations with Japanese, American, and Singapore universities. The proposal is a continuation of the excellent and efficient previous cooperation under the Erasmus international program. This collaboration will open up the possibilities for extensive internationalization with Europe. On the other hand, TUC has developed significant research results in application areas of electrical engineering and computer science, with internationally recognized contributions in areas including telecommunications, signal and image processing, software and hardware engineering.

The two institutions, TUC and NIT, share similar values, are both rather small but vibrant institutions focus on engineering aspects and strive for excellence. Furthermore, they show important complementarity in both the areas of expertise and the educational system and for these reasons, they form perfect match for international cooperation within the Erasmus+ ICM for developing strong international ties towards strengthening the excellent aspects of both parties for the benefit of students and academic staff.

The particular area of collaboration will be the hardware and software cutting-edge developments in image processing and understanding. TUC will contribute with the development of algorithmic applications in medical imaging, with the support of machine learning tools for the detection and characterization of important structures in images. NIT will provide valuable expertise on structural and texture features of images, along with the hardware implementation of algorithmic schemes. Both institutions will contribute to merging the teaching gaps between the two educational systems. Furthermore, they will develop mutual understanding on the benefits of applications versus the mathematical formulation of systematic approaches.

TUC and NIT aspire to attract academic staff and 3rd cycle students (from TUC to NIT and reverse). The proposed flow mobility predicts 2 academic staff from each University (for teaching and training) for 7 activity days each, one 3rd cycle student from each institution, for a total duration of 3 months each. The academic staff will be engaged in both teaching and training, being exposed to the methods of theoretical and practical experiments developed in the host institution. The aim of teaching is to exchange practices in education and inter-relations between hardware acquisition and software analysis of images in the wider framework of digital transformation. The students will be engaged in the experimental procedures of the host institution and will complete part of their thesis in the host institution. The student from NIT will aim to support his/her PhD thesis on the algorithmic software support for the analysis of images and the evaluation of the statistical dependencies and implications for medical diagnosis. On the other hand, the student from TUC he/she will be educated on the aspects of imaging equipment and image acquisition, before the analysis of such results.

Green transfers" (train) will be suggested to participants from each institution but it is unknown if they will be able to take place due to unforeseen travel restrictions due to the virus. Emphasis will be given from both institutions on imaging aspects with applications in medical diagnosis. The staff from TUC will teach advanced principles of image processing and image modeling and also will focus on lectures related to modern aspects of image processing and data mining with applications in bioinformatics, bio-signal analysis and medical Imaging, biomarker selection for early disease diagnosis, modeling of disease state and progression, as well as

cancer research on diagnosis & prognosis. The training for the TUC staff will focus on the mathematical models of image formation systems, as well as on the hardware aspects of image acquisition and real-time processing systems.

Teaching staff will focus on the fundamental principles of vision and distributed vision systems in diverse concepts of medical imaging, and finding structures and texture forms of different non-destructive materials through image processing. The training for the NIT staff will aim towards laboratory means used at the host institution for feature extraction from images, structure detection and machine learning in decision-making. Furthermore, teaching from NIT staff to TUC aims to expand the horizons of the latter on hardware issues of image acquisition, which will supplement the extensive experience of TUC in image analysis. The aspects of biomedical imaging devices is of particular interest, which will greatly benefit the strategic plans of TUC towards becoming a leading European institution in biomedical signal/image analysis and technology. Thus, the mobility plan aims to create a holistic structure for teaching and training on the general aspects of imaging systems and techniques. The PhD students will carry out part of their research at the corresponding labs of the host University. As explained above, the PhD student from NIT will gain valuable experience in analysis and statistical evaluation of decisions, whereas the PhD student from TUC will be exposed to the imaging equipment technologies.

The main parameters of the proposed cooperation have already been pre-designed in communication with NIT, such as the following.

Adherence to the principles of the Inter-institutional agreement and the required procedures before, during and after the mobility have been pre-agreed. Erasmus management officer and Inclusion Officer from NIT has been appointed Dr. Koushlendra Kumar Singh, Assistant Professor at Department of Computer Science and Engineering. Dean Research and Consultancy of NIT, Prof. Ram Vinoy Sharma has been appointed as the legal representative of the inter-institutional agreement. Academic coordinators of the collaborating Faculties for the proposed activities have been appointed, respectively, Prof. Katerina Mania and Prof. Ram Vinoy Sharma.

Professor Ram Vinoy Sharma and Dr. Koushlendra Kumar Singh have stated that they can co-supervise the dissertations of the incoming student and contribute to the activities of the 2 incoming staff members for teaching and training. Professors Zervakis Michalis, Prof. Dionysios Christopoulos and Prof. Eutychios Koutroulis have stated that they can co-supervise the dissertations of the incoming student and contribute to the activities of the 2 incoming staff members for teaching and training.

Erasmus management officers have already been informed about the academic calendars. The recommended language skills for incoming staff members at each Institution is English/C2 while for incoming students to both Institutions is also English/B2.

A committee formed in NIT will be responsible for the selection and the evaluation of the participants, according to their academic record, level of the English language, objectives and added value of the mobility, special needs. Academic staff criteria will be based on their research interests, previous projects, communication skills, prior participation, and teaching plan.

C. IMPACT AND DISSEMINATION

Ερώτημα C (Σε επίπεδο περιφέρειας, για κάθε πρόταση συνεργασίας με συγκεκριμένο ΑΕΙ /20βαθμοί)

The target groups that will benefit from the project are doctoral students, young people engaged in digital transformation, the administrative staff, the faculties, the researchers, industries in the fields of digital and medical diagnostic technologies and for the local and national-level society.

The expected impact of the Erasmus+ ICM Program for the participants of each institution can be summarized in the following.

a) **For exchange students:** They will improve their learning performance and scientific knowledge as well as their foreign language skills. They will also become aware of technologies and algorithmic tools in the host institution, most of which are common in both regions but the mentality of application is different. The PhD students will transmit their experiences to their fellow students who would wish to participate in the Erasmus+ ICM Program. Thus, they will be able disseminate the acquired knowledge to their regions and develop a broader mentality towards research and education. In addition, they will enhance their inter-cultural awareness, acquaintance with international recognized researchers, and will increase their motivation for taking part in future international education/training programs. It is expected that inbound students and academics' research outcomes, will be published in scientific journals.

b) **For academic staff:** Academic staff will share their teaching experiences, will propose improvements to the mobility procedures, new teaching methodologies and new approaches for the University's service upgrade. They will strengthen their academic collaboration on existing common research interests, thus improving their academic profile. Through the academic collaboration, they will be able to join forces towards a more effective handling of modern imaging systems from both hardware and software point of view. Furthermore, they will further disseminate (in local, regional, national and international level) their collaboration results, under the Erasmus+ ICM umbrella. Such collaboration is expected to lead to common applications for funded research programs. Academic staff will also learn about the strategies and programs of the Universities, which they will visit, and they will transfer such information to their own institutions. The above collaboration is expected to lead into common publications to reputable journals and conferences.

c) **For the Universities:** Increased capacity to operate at international level with improved management skills and internationalization strategies, development of cultural/economic/academic linkages with partners from other countries, increased quality in the preparation/implementation/monitoring this kind of projects, an improved professional environment, development and support of tools to promote mobility and reinforce their scientific quality. The complementary expertise of the proposers from both sides is selected as to design a holistic project area with mutual benefits to the academic and student communities of both TUC and NIT. Each participant institution will become aware of the different Programs operated by the other University and will have the opportunity to adjust and improve its own programs. Several seminars and mini workshops will be co-organized by the Universities. The produced teaching or/and the training material will remain to the host institution so as to be widely used after the project duration and form the basis for the academic program modernization and improvement. It should be emphasized that the topic of modern image processing with software and hardware aspects is of great a variety of departments from the two Universities In particular, in NIT the Departments of Computer Applications, Computer Science & Engineering, Electrical Engineering, Electronics & Communication Engineering, Metallurgical and Materials Engineering, Production & Industrial Engineering all make heavy use of applications of image processing and machine learning for information extraction from images. Similar interests are shared by the Schools of Electrical & Computer Engineering, Production Engineering and Management, Environmental Engineering and Mineral Resources. Thus, it is expected that the impact of this project will go far beyond the horizon of this project and will cover a variety of topics from both Universities. At regional level, more awareness will be achieved about benefits from student and academic staff international exchange. It is expected that inbound students and academics' research outcomes, will be published in scientific journals.

e) **For the researchers:** The proposed mobility targets to join the gap between scientific and technical developments of image processing in medical imaging, with TUC offering expertise on advance algorithms and NIT offering scientific support to hardware implementation aspects. This holistic approach offers opportunities

for new scientific developments in medical applications, which will be the focus of PhD student research and traineeship. Publications will be targeted to international conferences and journals in the areas of image analysis, medical image processing, sensors and devices, as well as in engineering education.

d) For the Industry: It is also expected that research will be reinforced between the two Institutions, based on research activity that can attract further local industrial funds.

Furthermore, the results of mobility will be disseminated at both Universities through the following ways: official announcements on TUC and NIT official websites and on social media (Facebook, Instagram, LinkedIn etc.), press releases and participants' interviews, presentations/events addressed to academic staff and students where returnees will report their experience from the exchange, news of Erasmus in Universities Newsletters (texts, photos and testimonials will be published at the end the academic year).

e) For the local and national-level society: The proposed program, besides the direct outcomes, contributes to the built-up of intercultural relations and competences in digital education and critical thinking through the collaboration of problem solving in biomedical technologies, including both algorithms and equipment. This holistic environment ensures the sustainability of healthy development of all youth on digital techniques and harness technology for social good. Besides the development of new jobs, it contributes to the creation of a culture with emphasis to awareness and understanding of societal problems related to health issues and social health care, through the participation of young people in digital transformation.