

## 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 (1<sup>st</sup>, 2<sup>st</sup> 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 Ιδρύματος, 40 βαθμοί)**

The School of Electrical and Computer Engineering of TUC and the College of Engineering & Computer Science of Wright State University (WSU) in U.S.A will participate at the proposed collaboration on the education field "Engineering" (ISCED code: 0711) in the scientific area "Computer Science, Biomedical, Assistive Tech, AI". WSU and TUC have set their strategic objectives as to promote sciences, create cutting-edge knowledge in modern aspects of technology, educate best practices in

teaching modern technological developments with experimentation and laboratory training, along with providing high-level research opportunities with global exposure. Synergies and collaboration with a fast developing institution such as WSU, USA, are very important for establishing scientific and practical educational partnerships in Europe.

The proposed research focuses on the priority of “Digital Transformation”, in particular in the area of healthcare and assistive living. The thematic topic is briefly presented as “BIO-AI Synergies for Assistive Technologies”, as graphically depicted in the accompanying figure. The above synergies of bioinformatics and biomedical areas with the assistive technologies, mobile measurement devices and Internet of Things (IoT), linked with the current advances of artificial intelligence (AI) and deep learning, provide the grounds for the development of novel technological mechanism for monitoring of health vital signals of individuals and early disease diagnosis. In particular, we will consider markers of cardiovascular diseases, with the aim of creating a digital ecosystem on this health priority able of providing predictions and short educational sessions for explaining the algorithmic results. Overall, the proposed strategic plan aims to enhance the digital skills of students, but also young people in agricultural sectors of fewer opportunities, in the health sector. The collaboration between Greece and USA in rather agricultural regions with fewer opportunities, will enable the exchange best practices on common values and develop long-lasting cooperation for addressing cross-cultural attitudes in digital transformation, education and training.

The two institutions involved in this proposal cover complementary aspects of the scientific and academic requirements for the successful outcome of this proposal. As outlined above, WSU has extensive experience in bioinformatics, bioengineering and assistive technologies, while TUC demonstrates extensive capabilities in biomedical applications coupled with hardware and AI capabilities. Building a strong cooperation with TUC is essential for solving such critical and challenging problems and sharing ideas with European Universities. In particular, the proposed project involves collaboration in the AI intersection of Bioinformatics that involves epigenetics (\$7.5M funding from ONR at WSU),

Bioengineering systems (\$1.5M funding from NSF at WSU), and Assistive Tech (\$3.5M funding from NSF-IGERT at WSU). It is expected that the implementation of this program will give great opportunities to underprivileged young people and students of fewer opportunities, as well as students with disabilities, for exposure to current trends and cutting-edge technologies. WSU is viewed as a leader in the education of underrepresented populations in Science, Technology, Engineering and Mathematics (STEM) areas. WSU has numerous existing and highly successful programs that target minorities and students with physical disabilities. The campus was constructed to be architecturally barrier free and has an Office of Disability Services that provides service to 550 students with disabilities. TUC campus has also been constructed with care to disability services and provides free accommodation to students with less income and opportunities, as to be able to devote to their studies in STEM areas.

The proposal for cooperation on behalf of Institutions is submitted by professors Zervakis Michalis and Nikolaos Bourbakis who have already expressed their strong interest based on their existing successful collaborations. Prof. Nikolaos Bourbakis (IEEE Life Fellow, AAIA Fellow) has more than 40 years extensive industrial experience and academic experience on the development of novel research methodologies relevant to AI, computer vision, assistive intelligent robotics, biomedical engineering, cybersecurity, and system architectures. He has extensively published (500 pubs) in IEEE and International Journals and Conferences, and he has graduated several dozens of PhD students. His research work has been

internationally recognized and won numerous high prestigious awards in IEEE, Universities and Societies. Michalis Zervakis serves as Vice-rector of Research and Life-long Learning at TUC. His research interests include applications of bioinformatics, biostatistics, biomedical signal analysis and medical imaging systems, biomolecular modeling of disease state and progression (diabetes, dementia, Alzheimer's disease), cancer research on diagnosis & prognosis (breast, brain and ovarian cancer, leukemia). He is coauthor in more than 280 scientific papers in international journals and conference proceedings.

Prof. Bourbakis and his colleague Prof. Michael Raymer (PI) from WSU had a collaboration on an NSF grant for the development of an undergraduate program on Bioinformatics. Prof. Zervakis and his colleagues Professors Apostolos Dollas and Euripides Petrakis have successfully collaborated in several projects on AI, Imaging and Bioinformatics. They have all established joint collaborations in several projects and recently Prof. Bourbakis has been elected as a honorary Prof. at TUC, significantly strengthening this partnership. In addition, Prof. Raymer (Chairman of CSE Dept at WSU) brings expertise in Engineering Education, which is of utmost importance in the design of engineering educational programs. The proposed collaboration for TUC is an imperative continuation of the previous collaboration in a complementary scientific area with the Rochester University of Technology in the framework of the international Erasmus program.

In the present project, TUC proposes the mobility exchange of 2 academic members for teaching from each Institution for 7 activity days each, as well as one outgoing academic member for training from each Institution for 7 activity days each, on novel imaging equipment structures. Furthermore, 2 incoming and 2 outgoing graduate student (Master's or PhD candidates) for 2 months each. The academic staff will be engaged in both teaching and training on the procedures of the host institution. The students will complete part of their thesis in the host institution. One member of the participating academic staff from TUC and WSU will offer lectures in English focused on modern issues of imaging with applications for monitoring and abnormal event detection in sequences of biomolecular images. The other staff member will offer lectures on assistive technologies for monitoring and assisting people in need. The outgoing academic member from each Institution will train on novel imaging and bioinformatics equipment structures. The participating students will carry out a part of their dissertation research on bioinformatics, biomedical engineering, assistive technologies by using synergistic AI methods for accomplishing the targeted goals. Innovative teaching methods of both Universities will be open to graduate students from the two parties, who will work at each other Institutions' laboratories with the supervision of the host advisors, in order to understand the procedures and techniques of the host and deliver this knowledge to their home institution. Based on the complementary strengths of the two institutions, the two incoming students at TUC will develop scientific knowledge on issue related to signal and image processing, IoT and biomolecular techniques, hardware development on embedded systems. Alternatively, the outgoing student will be engaged in bioinformatics and assistive technologies. The aim of student exchanges will be the submission of two scientific papers in high quality conferences or journals. Graduate students incoming to TUC will be trained on algorithmic issues of software and hardware applications in healthcare, while incoming students to WSU will be trained on the goal and methodologies of assistive technologies.

The main parameters of the proposed cooperation have already been pre-designed in communication with WSU, such as the following. Adherence to the principles of the Inter-institutional agreement and the required procedures have been preagreed. International Office at WSU (<https://people.wright.edu/search/people/International%20Office>) will take over the corresponding management of the program. Inclusion Officer at WSU: Prof. Michael Raymer (WSU),

Chair of the Department of Computer Science and Engineering. Legal representative of the inter-institutional agreement: Dean Brian

Rigling. Academic coordinators of Faculties: Prof. Katerina Mania (ECE) and Prof. Nikolaos Bourbakis (WSU). Professors Nikolaos Bourbakis and Michael Raymer have stated that they can co-supervise the dissertations of the 2 incoming students and contribute to the activities of the 3 incoming staff members for teaching and training. Professors Zervakis Michalis, Apostolos Dollas and Euripides Petrakis have stated that they can co-supervise the dissertations of the 2 incoming students and contribute to the activities of the 2 incoming staff members for teaching. Academic calendar of WSU: <https://registrar.wsu.edu/academic-calendar/>. Criteria for evaluation of students are academic achievements, percentage of courses completed in their course, number of publications, knowledge of English language. Criteria for evaluation of staff are the academic achievements and quality of the proposed mobility plan.

### **C. IMPACT AND DISSEMINATION**

#### **Ερώτημα C (Σε επίπεδο ιδρύματος/20βαθμοί)**

The target groups that will benefit from the project are postgraduate and doctoral students, young people engaged in digital transformation, the administrative staff, the faculties, the researchers, industries in the fields of project, digital and healthcare technologies in general. As the proposed program involves exchange of academic, it is expected that it will form an organized and fertile knowledge dissemination forum through meetings and open discussions with colleagues and students, and through submitted formal propositions. All participants will be asked to participate in national events for nonacademia professionals in order to present their experiences and promote such international cooperation efforts. Dissemination to the general public and interested scientific communities will be facilitated through social network media

(Facebook, LinkedIn and Twitter) but also research-oriented media (ResearchGate). The experiences and results from this International Mobility Program will be also uploaded to both Institution's social media and an Erasmus+ newsletter with testimonials will be sent to all the TUC partners. 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. It will further enable young students to get exposed to other scientific environments, opening their horizons and their perspectives. 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. Thus, they will be able to 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 internationally recognized researchers, and will increase their motivation for taking part in future international education/training programs. WSU hosts world-class facilities and award-winning researchers (NSF, NIH, DARPA, AFRL, ONR, other) and scholars. Besides the academic standards, WSU is close to various industries and one of the large Air force Bases with a great variety of opportunities to young students for employment and hands-on experience. This qualitative determinant is of primary importance to the wellbeing of students and young researchers who strive to excel in the first steps of their careers in a wide-open international work environment.

Graduate students are going to present in public their work and participate in relevant conferences, lectures and projects. Recommended well known international Conferences like: the 22nd IEEE Int. Conf. on Bioinformatics & Bioengineering

(BIBE), the 34th IEEE Int. Conf. on Tools with Artificial Intelligence (ICTAI), the 13th IEEE Int. Conference on Information, Intelligence, Systems & Applications (IISA), the newest Int. Workshop on Hybrid Intelligence. In addition, well established international journals will be considered for publications, like the IEEE Trans on Biomedical Engineering, the IEEE Robotics & Automation, the Trans. on Bioengineering & Bioinformatics, Int. Journal on Artificial Intelligence Tools and others.

b) For the regional society and young people interested in digital transformation: The benefits for such participants with fewer opportunities extend from the educational aspects on health issues, improving lifestyle and getting scientific attitude on healthcare. Further benefits include the enhancement of the digital skills, the opportunity to expand their accessibility in mobility and address health problems in a rigorous scientific way, opening up ways of further education and exposure to cultural differences.

c) For academic staff: They will strengthen their academic collaboration on existing common research interests, thus improving their academic profile. 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. Such collaboration is expected to lead to common applications for funded research programs. Through the academic collaboration, they will be able to join forces towards a more effective handling of modern 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. The 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. In addition, 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. The proposed collaboration in education and dissemination events will be highly boosted through the proposed Erasmus+ program, giving rise to new research perspectives and applications in this field of with modern equipment and cutting edge technologies and acquisition of knowledge from the data.

The mobility plan is relevant to education, innovation and research vision of both Institutions. Further research plans will be completed so as to continue sharing the same vision for academic excellence and paying attention in mentoring future international scientific experts.

e) For the researchers: The complementary expertise of the two institutions is expected to bring revolutionary methodologies in tissue examination for abnormalities detection related to early stage abnormal event monitoring, prediction and detection. The long experience of the proposing professors emphasizes this complementarity in scientific endeavors involving Artificial Intelligence, Machine Learning, Biomedical Technologies and Bioinformatics.

d) For the Industry: It is also expected that research will be reinforced between the two Institutions, based on research activity of industrial interest that can attract funds for both institution from Europe and USA.