

**INTERNATIONAL COOPERATION AGREEMENT
FOR THE ESTABLISHMENT OF A TRIPLE MASTER'S DEGREE
BETWEEN
THE UNIVERSITY OF BORDEAUX, FRANCE
AND
UNIVERSIDAD AUTÓNOMA DE MADRID, SPAIN
AND
THE PAZMANY PETER CATHOLIC UNIVERSITY OF BUDAPEST, HUNGARY**

Hereafter referred to, individually or collectively as « partner universities », the University of Bordeaux (UB), coordinator institution represented by its President, Pr. Manuel Tunon de Lara, the Universidad Autónoma de Madrid (UAM), represented by its Rector, D. José M. Sanz, and the Pazmany Peter Catholic University (PPCU), represented by its Rector, Dr. Szabolcs Szuromi DSc, agree on the establishment of a two-year syllabus to set-up a postgraduate triple-degree in the **Image Processing and Computer Vision (IPCV)** domain, which will enable a student to obtain the following degrees (see details in article VIII):

From UB, either the Master degree in "Informatique, spécialité Image, Son, Vidéo (ISV)", or the Master degree in "Mathématiques, spécialité Traitement des signaux et des images (TdSI)", or the Master degree in "Electronique, automatique, productique, signal et image (EAPS), spécialité Traitement des signaux et des images (TdSI)";

from UAM, the Master degree in « ICT Research and Innovation (i2-ICT)»; and

from PPCU, either the Master degree in "Engineering Information Technology, specialization in IPCV", or the Master degree in "Info-Bionics, specialization in IPCV".

The three universities,

Considering the decision of University of Bordeaux's management board ("Conseil d'administration") dated January 17th, 2014 concerning the delegation of authority to the President of the University,

Considering the communication of the present agreement to the French Ministry of Higher Education and Research and to the French Ministry of Foreign Affairs,

Considering the recommendation of the direction of the Faculty of Computer Sciences ("Unité de Formation") concerning the present agreement

Considering the recommendation of Sciences and Technologies College Board (Conseil de Collège) concerning the present agreement dated June 26th, 2014

Considering the recommendation of University of Bordeaux's Studies and Student Affairs Commission (« Commission de Formation et de la Vie Universitaire ») concerning the present agreement dated June 26th, 2014

Considering the French Education Code and in particular articles L.123.7 and D.123-15 to D.123-22 related to the higher education public service's missions in relation to international affairs,

And considering the legal procedures required by the Universidad Autónoma de Madrid and by the Pazmany Peter Catholic University,

HAVE AGREED WHAT FOLLOWS:

I. Objective and scope of the agreement

The partner universities have decided to pool their complementary expertise to develop an international postgraduate cooperation in the "Image Processing and Computer Vision" domain (hereinafter *IPCV Initiative*) so as to offer a triple Master degree (see article VIII) via a high-quality and attractive Master-level 120 ECTS syllabus (see Annex B), adapted to the needs of the job market.

The purpose of this agreement is to record the decisions and the involvement of the partner universities to run this Master-level initiative and to outline the principles and terms of their cooperation.

All partner universities are accredited to offer Master's programs, according to their respective national legislation. This agreement will be implemented within the legal requirements at each partner university. The provisions of this agreement shall not be construed so as to diminish the fully autonomous position of any of the institutions.

II. Cooperation mechanisms/coordination

The partner universities will form a *IPCV Committee*, consisting of 1 or 2 members from each cooperating university, initially consisting of:

- For UB: Aurélie Bugeau
- For UAM: Jesús Bescós
- For PPCU: Peter Szolgay, Henrietta Novák

In case there is a change of contact person at one cooperating university, the partner should promptly notify the other partner universities.

The IPCV Committee will meet every year to discuss all major academic and administrative issues regarding the IPCV Initiative, including changes in the program description (curriculum). Minutes of the meeting should be produced and distributed to the administrative services in charge of the follow up.

Any change will be subject to final approval by the partner universities. All partner universities will ensure the academic and administrative capacity necessary to execute this agreement at their own institutions.

III. Description/objective of the Initiative

1. The aim of the program is to give the students theoretical and practical knowledge in Image Processing and Computer Vision (IPCV), allowing them to adapt to any kind of job related to this topic. The Master-level syllabus will be offered as a 120 ECTS study program with a nominal length of two academic years.
2. The language of the IPCV syllabus courses is English. The courses and seminars as well as examinations and Master's thesis, will be all conducted and/or submitted in English. To the extent that it is possible, the partner universities will give the IPCV Initiative

students the opportunity to attend introductory courses in the national language and culture.

3. The partner universities have jointly decided upon the skills, knowledge and competencies which the graduates of the IPCV Initiative are expected to possess upon the completion of the program. The partner universities have agreed on a program description for the IPCV Initiative, outlining common objectives, curriculum and structure for the program (see **Annex A**. Program Description).
4. Student mobility is an essential and integrated part of the IPCV Initiative. In order to benefit from the knowledge of the three partners, participating students will together spend an entire semester in each university. More precisely, the students will spend successively one semester (30 ECTS) at the PPCU, one semester (30 ECTS) at the UAM, and one semester (30 ECTS) at the UB. The fourth semester will be devoted to the Master's Thesis that can be developed in a company or in a research laboratory worldwide.
5. The IPCV Initiative will be subject to systematic evaluation and quality assurance in order to further develop the program.
6. The periods of study and examinations passed at one university will be fully recognised by the other cooperating universities, according, if required, to the tables of equivalences of the respective diplomas awarded by each partner University (see **Annex C**).
7. Examinations will follow local rules at each partner university.

IV. Examination

During the program, each semester will have to be validated following the rules of the partner University where the student is currently studying.

V. Students' application and selection criteria

1. Each partner University will advertise the IPCV Initiative in its website and by any other means considered appropriate. Each partner University will be in charge of its student selection for the program.
2. Applicants must fulfill the following requirements:
 - Hold a Bachelor degree in Sciences or Engineering.
 - Have an adequate knowledge of written and spoken English, equivalent to B2 according to the CEFR.
3. Students will be selected based on their Curriculum Vitæ and an interview by the local Committee. A grade of above average in the courses concluded before the mobility is desired.

VI. Student admission, registration and attendance

1. The number of students to be admitted in each cohort is to be negotiated annually between the participating institutions in accordance with local capacity and regulations, considering a maximum of 6 students per partner University and year. The IPCV Initiative will start in September 2014.
2. Each student admitted to the program is registered at the three universities. Each partner University undertakes to keep appropriate records of the students attending the courses at their institution, and to provide all students and the other partner universities the certification of the corresponding courses.

3. Students will be subject to the regulations and procedures of the institution at which they follow courses in a given semester. They will be provided with the same academic resources and support services that are available to all students at that institution.
4. The appeals policy and procedures in matters relating to modules, assessment and practical matters at each individual institution are subject to national and institutional regulations at the institution responsible for the module.
5. Each cooperating university will develop appropriate and adequate information material for the incoming students. Website, brochures and details of all courses will be made available.

VII. Tuition fees and student's financial responsibility

1. Fees

All students admitted to the IPCV Initiative will pay the tuition fees at their home university and shall be free of enrolment payments at the partner institutions. Students might have to pay the diploma issuing fees to obtain each University's Master diploma.

2. Grants:

Each partner University will provide information about the mobility grants available for its mobility students.

3. Students will be financially responsible for:

- a. Travel to and from the institutions they are attending during the length of the program.
- b. Books, stationery, etc.
- c. Travel documentation, visas, etc.
- d. Travel, accommodation, and living expenses.
- e. Student Association/General Services Charges.
- f. International insurance coverage relevant to their stay in a given country.

4. It is expected that all students have international insurance coverage relevant to their stay in a given country. The European Health Insurance Card is accepted for European students.

VIII. Triple diploma

1. Each student who successfully completes the IPCV syllabus, including the compulsory mobility program, will receive the national degree from each partner University, namely:

- from PPCU: either MSc degree in Engineering Information Technology; Specialization in IPCV; or MSc degree in Info-Bionics, Specialization in IPCV (the latter only applicable to PPCU's own students)
- from UAM: Master's Degree in ICT Research and Innovation (i2-ICT).
- from UB, depending on the previous studies of the students, either (this will be decided by UB during the admission process):
 - Master degree in "Informatique", spécialité "Image, Son, Vidéo (ISV)", parcours Image Processing and Computer Vision
 - Master degree in "Mathématiques", spécialité "Traitement des signaux et des images (TdSI)", parcours Image Processing and Computer Vision

- Master degree in "Electronique, automatique, productique, signal et image (EAPS)", spécialité "Traitement des signaux et des images (TdSI)", parcours Image Processing and Computer Vision

2. At the end of the program each student will be issued with a certificate of participation in the IPCV Initiative by UB as coordinator institution.

IX. Quality assurance

Monitoring the quality of the IPCV Initiative will be undertaken through:

- an internal evaluation following the local rules of each partner institution
- a joint evaluation procedure organized at the partnership level.

1. Internal evaluation

The quality of the courses offered by each partner institution will be ensured through the appropriate internal bodies in each partner institution:

- a. PPCU: at the end of the semester in Budapest, students will fill in an evaluation form about each course and their semester in general, respectively. Professors taking part in the IPCV program will have a meeting at the end of the semester, to discuss their experiences and considering the students' feedback.
- b. UAM Master Degrees all follow the Internal Quality Insurance System (SGIC), which establishes procedures to evaluate and enhance the quality of study programs, and of the teaching activity and personnel. Students' evaluation will be further performed according to the teaching guide available for each course.
- c. UB: at the end of each semester, students at University of Bordeaux are asked to evaluate each course and to list the positive and negative aspects of the formation. Discussions between professors about the consistency of the courses are conducted after each semester in order to improve the quality of the program.

2. At the partnership level

- a. Establishment of the *IPCV Committee*, as indicated in article II.
- b. Joint review of the IPCV program structure, contents and operations during the annual meeting of the *IPCV Committee*, to be held at one of the partner universities, or by video-conference.
- c. The *IPCV Committee* will collect information to evaluate the program by its success in terms of completion of the Course: time to get the first employment, career performance, etc.

X. Disputes, Renewal, termination and amendment

1. This agreement will be valid from August, 31st 2014 for a period of 3 years (2 cohorts) provided that the national Master programs are still accredited at each partner institution.
2. The agreement may be extended by mutual consent of the parties in writing.
3. Changes and amendments, at the time of renewal or while the agreement is in effect, to this agreement must be in writing and approved by all cooperating universities.

4. The parties agree that any conflicts arising from the present agreement, will be resolved by a joint committee set up for that purpose. In case a friendly solution is not possible, both parties will submit to international arbitration to resolve potential disputes.
5. Any cooperating university may withdraw from this agreement, giving six months' written notice to the other institutions. However, students who have commenced their studies at any of the cooperating university at the date of termination are entitled to complete their courses of study and the program at all institutions.
6. If all the cooperating institution should agree to terminate the joint study program, all the cooperating institutions are obliged to make arrangements for all students who have commenced their studies to complete their courses of study and the program in a satisfactory way.

XI. Signatures

Agreed,

Signature UB
Date and place:

Signature UAM
Date and place:

Signature PPCU
Date and place:

Pr. Manuel Tunon de Lara
President

Dr. José M. Sanz:
Rector

Dr. Szabolcs Szuromi Dsc
Rector

ANNEX A: PROGRAM DESCRIPTION

Introduction

Images and videos are present everywhere in the world today. They are more often used in a lot of fields such as medicine, surveillance, industrial control, remote sensing, e-commerce, automation. Having a strong background on how to process and analyze images and videos gives access to many job opportunities in various firms. Nowadays, there are only very few training courses entirely dedicated to image processing and computer vision. Therefore the three cooperating universities have decided to pool their complementary expertise to offer an international Master-level syllabus in "Image Processing and Computer Vision" (IPCV) so as to give students theoretical and practical knowledge allowing them to adapt to any kind a job related to this topic.

In order to give students this strong knowledge, combining the skills from several universities is necessary.

The proposed IPCV Initiative is based on the national Master programs of each partner institution, namely:

- Master in Engineering Information Technology, PPCU, Hungary
- Master in Infobionics, PPCU, Hungary
- Master i2-ICT (Research and Innovation in Information and Communication Technologies), UAM, Spain
- Master Informatique – spécialité Image, Son, Vidéo (ISV) - parcours IPCV, UB, France
- Master Mathématiques - spécialité Traitement des signaux et des images (TdSI) - parcours IPCV, UB, France
- Master Electronique, automatique, productique, signal et image (EAPS) - spécialité TdSI - parcours IPCV, UB, France

The three universities involved have complementary expertise. PPCU is indeed specialized in automatic, and data and signal processing; UAM in video analysis and computer vision; UB in discrete, variational and Bayesian processing and analysis of images.

Combining these three fields of expertise would give the student the opportunity to obtain a large overview of existing techniques and a good general knowledge in image processing and computer vision.

By its international character, the IPCV Initiative will allow:

- to attract very good students in our courses by offering them the opportunity to follow two semesters in other European countries
- to strengthen the collaborations both in terms of teaching and research between the three universities and the associated laboratories. In this perspective, the mobility of professors will be encouraged/promoted.

Curriculum and structure

IPCV students will all follow the same schedule. They will spend an entire semester in each university: the first semester (30 ECTS) at the PPCU, the second one (30 ECTS) at the UAM, and the third semester (30 ECTS) at the UB. The fourth semester will be devoted to the Master's Thesis (30 ECTS), by default in the home university, or alternatively in a company or in a research laboratory worldwide. A detailed view of the courses that structure the program is provided in Annex B.

All courses will be provided in English language to the students in all 3 partner institutions.

Tutored Research Project

During the curriculum, 12 ECTS will be compulsory dedicated to tutored research activity. One of the main goals of this common course is to keep a continuity between this activity in the second and third semester. Therefore the topics and tasks will be proposed in collaboration between one teacher from UAM and one teacher from UB. The students will then be able to dedicate long-term effort to the same problem that will be tackled in two different but complementary ways.

These courses will also be a way to start new collaboration of research between the partner universities

Academic Calendar

All students will follow the same course curriculum except for a few optional courses in the first semester. The calendar will therefore be the same for everyone. Namely, the first semester will be held in Budapest, the second one in Madrid and the third one in Bordeaux. The training period on the other hand can take place in any country.

1st semester: PPCU, Budapest

Starts: Beginning of September

Ends: Mid-December

Exams: Mid-December to end of January

2nd semester: UAM, Madrid

Starts: End of January

Ends: Beginning of May

Exams: Mid-May

3rd semester: UB, Bordeaux

Starts: Beginning of September

Ends: December

Exams: Beginning of January

4th semester: Training

Defense: beginning of September

Examination Rules

During the IPCV curriculum each semester will have to be validated according to the examination rules of the welcome University.

- **For the first semester at PPCU:**

Each course description contains the requirements for the respective subject. The student will be credited for subjects with successfully passed exams only. The student may try to re-take a failed exam once during the exam period. However, if he/she is unable to pass the exam during the exam term, the student can retry the exam during the next exam period (Mid-May to end of June).

- **For the second semester at UAM:**

The student will have to pass all the subjects. Every subject has its own evaluation policy, described in the teaching guide available by the enrolment period.

- **For the third semester at the UB:**

The students will have to reach an average grade above 10 to pass. No exam resit will be proposed except for particular reasons such as illness.

If a student does not pass his/her first semester, he/she can still go on with the second semester. Nevertheless he/she will have to retake the exams of the failed semester the following year.

This evaluation scheme is subject to modifications upon continuous evaluation of the program.

ANNEX B : PROGRAM STRUCTURE

First semester (at PPCU)		
Course name	ECTS	Character
Functional Analysis	5	Compulsory
Parallel Computing Architectures	3	Compulsory
Numerical Analysis	4	Compulsory
Basic Image Processing Algorithms	5	Optional
Stochastic Signals and Flows	5	Optional
FPGA-based Algorithm Design	5	Optional
Biomedical Signal Processing	4	Optional
Programming Methodology	5	Optional
Intelligent Sensors	3	Optional
TOTAL (offered/coursed)	39/30	
Second semester (at UAM)		
Course name	ECTS	Character
Applied Bayesian Methods	6	Compulsory
Biomedical Image Processing and Biometrics	6	Compulsory
Video Sequences Analysis for Video	6	Compulsory
Tutored Research Project 1	6	Compulsory
TOTAL (offered/coursed)	30/30	
Third semester (at UB)		
Course name	ECTS	Character
3D imaging	6	Compulsory
Image and Inversion	6	Compulsory
Advanced tools in image processing	3	Compulsory
Video Analysis and Coding	6	Compulsory
Project Management	3	Compulsory
Tutored Research Project 2	6	Compulsory
TOTAL (offered/coursed)	30/30	
Fourth semester		
Course name	ECTS	Character
Master Thesis	30	Compulsory
TOTAL (offered/coursed)	30/30	
GRAND TOTAL (offered/coursed)	129/120	

ANNEX C : TABLE OF EQUIVALENCES

Table of equivalences for UAM's Master in I2-ICT						
I2-ICT Master			IPCV Syllabus			
Course name	ECTS	Character	Equivalent course	ECTS	Character	Coursed in - sem
Intensive Calculus and Large Scale Data Administration	6	COMP	Functional Analysis	5	COMP	PPCU – S1
			+ Parallel Computing Architectures	3	COMP	PPCU – S1
			+ Numerical Analysis	4	COMP	PPCU – S1
Scientific and Technological Projects Management	6	COMP	Project Management	3	COMP	UB – S3
Initiation to Research and Innovation	6	COMP	Tutored Research Project 2	6	COMP	UB – S3
Applied Bayesian Methods	6	OPT	Applied Bayesian Methods	6	COMP	UAM – S2
Biomedical Image Processing and Applications	6	OPT	Biomedical Image Processing and Applications	6	COMP	UAM – S2
Biometrics	6	OPT	Biometrics	6	COMP	UAM – S2
Video Sequences Analysis for Video Surveillance	6	OPT	Video Sequences Analysis for Video Surveillance	6	COMP	UAM – S2
1 Out-of-program course	6	OPT	3D imaging	6	COMP	UB – S3
Master Thesis	12	COMP	Master Thesis	30	COMP	PPCU/UB/UAM – S4
TOTAL	60					

