

**DOUBLE DEGREE AGREEMENT BETWEEN
UNIVERSIDAD POLITÉCNICA DE MADRID
AND TECHNISCHE HOCHSCHULE KÖLN**

**FOR IMPLEMENTATION AT THE MASTER IN INTERNET OF THINGS
AND THE MASTER OF COMMUNICATION SYSTEMS AND NETWORKS**

BETWEEN

On the one hand, the Universidad Politécnica de Madrid (hereafter referred to as UPM) having its head office at Av. Ramiro de Maeztu 7, 28040 Madrid, Spain, represented by Prof. Dr. Guillermo Cisneros Pérez, appointed Rector by Madrid Regional Government Council Decree 109/2020 of November 25th (published in Official Journal of the Community of Madrid No. 289 on November 26th), pursuant to the powers conferred upon me by the Statutes of the aforesaid university, passed by Decree 74/2010 of October 21st (published in the Official Journal of the Community of Madrid No 273 on November 15th, 2010),

And on the other hand, the Technische Hochschule Köln (hereafter referred to as THK), having its head office at Claudiusstraße 1, 50678 Cologne, Germany, represented by Prof. Dr. Stefan HERZIG, as its president and legal representative,

DECLARE

I

That the UPM is a Spanish public university which in the context of its educational activities awards a Master of Science (MSc) degree in "Internet of Things" (hereafter MIoT) to students fulfilling the requirements established in the corresponding study program.

II

That THK is a German University of Applied Sciences which correspondingly awards the degree of "*Master of Science in Communication Systems and Networks*" (hereafter MCSN).

III

That both UPM and THK, acknowledging the complementarities of MIoT and MCSN programs, through the signature of this agreement agree in promoting the exchange of students enrolled in either MCSN or MIoT so that they can be awarded with both MSc degrees.

NOW, THEREFORE, in consideration of the foregoing, the UPM and the THK hereby enter into and sign a Double Degree Agreement (DDA), in accordance with the following

CLAUSES

FIRST – PURPOSE OF THE AGREEMENT

The purpose of this agreement is to establish a framework for collaboration between the Escuela Técnica Superior de Ingeniería y Sistemas de Telecomunicación (ETSIST) at UPM, and the Fakultät für Informations-, Medien- und Elektrotechnik (F07),, at THK, in order to establish the conditions that students from these institutions must fulfil to gain the academic degrees of MIoT from the UPM and MCSN from the THK.

SECOND - CONDITIONS

1. There are 2 itineraries for the UPM and THK students to receive the Double Degree (see annexes), that are summarized as follows for the minimum requirement for each student:
 - a. UPM to THK (itinerary 1): students firstly enrolled in the MIoT (UPM as home university) must have completed a minimum of 48 ECTS credits of the MIoT program before enrolling at THK (host university).
 - b. THK to UPM (itinerary 2): students firstly enrolled in the MCSN (THK as home university) students must have completed a minimum of 30 ECTS credits of the MCSN program before enrolling at UPM (host university).
2. Students in both itineraries have to acquire 105 ECTS credits in total during their studies at both Universities in the respective Master programs to be awarded with both degrees, as specified in annex I.
3. The language of instruction will be English.
4. During their stay at the host university, students will be also enrolled in their home university. For this purpose, the current regulations on grants will be applied in the respective countries.

Students participating in the double degree program are exempt from paying tuition fees at the host university. This exemption does not extend to fees/charges for the issue of the official degree.

In order to have access to certain services (transportation, sports, internet, etc.) at the host university, hosted students will pay fees or public prices under the same conditions as the rest of students.
5. Students will be required to comply with academic regulations at both home and host universities, and with national laws in both countries.
6. Students are obliged to submit an up-to-date transcript of records with all their achievements to the examination office of the host university at the start of their stay therein, and to the examination office of the home university after returning from their semester abroad.
7. After successful completion of studies and according to the respective regulations, the UPM will award the degree of “*Master of Science in Internet of Things*” and the

- THK will award the degree of “*Master of Science in Communication Systems and Networks*”.
8. Both institutions will assist students in finding accommodation and in their social integration.
 9. Mobility will be supported through Erasmus+ Program or any other available funding means. If this is not possible, the home institution has the option to decide whether or not the mobility is authorized.
 10. Degree-seeking students will be encouraged to study the host university language (Spanish or German) during their stay. Both institutions will support them in improving their knowledge of the language of the host country.
 11. It is students' responsibility to have adequate health insurance cover for their study period abroad.
 12. Participating students are not eligible to apply for other mobility grants at the host institution.
 13. Students will be selected and admitted into the DDA among those enrolled in the corresponding MSc program at the home university (MIoT at UPM, or MCSN at THK). Admission criteria will be based on students' academic results, motivation and language skills. The selection will be carried out in collaboration between the two institutions. Admission of students will always comply with the regulations and procedures of the host institution.
 14. THK and UPM establish that the maximum number of participating students will be 3 per university and per academic year.
Both institutions will try to comply with the principle of reciprocity (the number of students received by each University in the exchange shall be equal to the number of students that are sent).
 15. Selected students are required to have a B2 English level, internet-based TOEFL higher than 80, IELTS band score: 6.5, or equivalent proof of English language proficiency.
 16. This agreement does not involve any financial obligation for any party.
 17. Students generally take their examinations and any repeat examinations at the university that offers the examination. In the case of repeat examinations, it may be offered the option of a remote examination under supervision. If such an examination takes place in writing, the exam will be sent to the examining colleague at the partner university for correction and assessment.

THIRD – IMPLEMENTATION OF THE AGREEMENT

Mobility from UPM to THK:

The UPM students must accomplish the following requirements to obtain a double degree (Annex I):

- Complete 48 ECTS credits corresponding to courses of MIoT at UPM during their first academic year in the DDA.
- Remotely do the research project required for MCSN under the joint supervision of one supervisor per institution. Grading of the project may be performed at THK after the student has moved or remotely.
- Complete 2 ECTS credits at THK corresponding to intercultural training or similar activities.
- Complete 15 ECTS credits at THK corresponding to compulsory courses of MCSN.
- Do a MSc thesis valued 30 ECTS credits (including defense) under the joint supervision of one supervisor per institution. MSc thesis should comply with both UPM and THK regulations. Defense will take place at UPM according to local regulations.

Mobility from THK to UPM:

The THK students must accomplish the following requirements to obtain a double degree (Annex II):

- Complete at least 30 ECTS credits of MCSN at THK, including 20 ECTS from compulsory modules, 5 ECTS from elective modules and 5 ECTS from profile modules, as indicated in Annex II.
- The research project required for MCSN (included in the abovementioned credits) will be done under the joint supervision of one supervisor per institution.
- Complete at UPM 30 ECTS credits of MIoT courses in the winter semester.
- Complete the remaining 45 ECTS credits of MCSN in the summer semester of the second year as indicated in Annex II.
- The MSc thesis will be done under the joint supervision of one supervisor from each institution. The work should comply with both UPM and THK regulations. Defense will take place at THK according to local regulations.

Grading of recognized courses will be done according to the regulations of each institution. However, an equivalence between grading systems is provided in Annex III for reference purposes.

FOURTH – EFFECTIVE DATE AND DURATION

This agreement shall remain in force for a period of four (4) years from the date of the last signature, with student mobility starting during the academic year 2024–2025 with the understanding that it may be terminated by either party providing a minimum of 6 months' advance written notice to the other.

This agreement may be extended by mutual written agreement of the parties, for a maximum of 4 additional years.

FIFTH – QUALITY ASSURANCE

Coordination of activities in the framework of this DDA will be carried out by a monitoring committee whose members will be the program coordinators of MIoT at UPM (Prof. Dr. Fernando Pescador del Oso) and MCSN at THK (Prof. Dr. Uwe Dettmar).

The monitoring committee will discuss all major academic and administrative issues related to the double degree program, including any changes made to the program itineraries. All decisions will be subject to final approval by the cooperating universities.

At TH Köln, the quality assurance of the Master's degree program "Communication Systems and Networks" is guaranteed by the university-wide system accreditation and the program is accredited. At Universidad Politécnica de Madrid the Master's degree program "Internet of Things" is accredited by the Spanish agency for accreditation of university programs ANECA, and the quality assurance is guaranteed by the UPM's internal quality assurance system, also recognised by ANECA.

The monitoring committee is also responsible for the quality assurance of the double degree program. At least every other year the committee discusses the results of evaluations at each partner institution in written or oral form. For reasons of documentation the discussions should be followed by a results protocol containing concrete measures developed from the discussion results. There are regular evaluations of the study program.

SIXTH – AMENDMENTS

The parties may amend this agreement at any time, provided the two signing parties expressly agree to do so. Such amendments must be approved by both institutions in a document signed by both parties, which shall be annexed to this agreement. When these steps have been taken, such amendments shall form an integral part of this document.

Amendments will be mandatory when the program content of either MIoT or MCSN is updated.

SEVENTH – TERMINATION OF THE AGREEMENT

This Agreement may be terminated for any of the following reasons:

- By mutual agreement between the parties.
- By expiry of the initial period of validity or of its extensions.
- By failure to fulfil the obligations that were established or due to having breached the duty of trust.
- In case of a continued negative evaluation by the monitoring committee, such as in the event of non-fulfillment of the mobility objectives.
- By unilateral decision taken by one of the parties, provided written notice to this effect is given six months before the date on which the agreement is to be terminated.

In any case, if the decision is taken to terminate this agreement prematurely, the two parties commit themselves to finish any undertakings that have already been started when notice of the termination is given. Specifically, students who have already been admitted into the double degree program will be allowed to complete their foreseen training itineraries.

If for any reason, one of the partner universities is no longer authorized to award its degree, this institution shall immediately notify the partners, and will be excluded from the program up to a new accreditation, without that it affects the students in the course of the year.



EIGHTH- RESOLUTION OF CONTROVERSIES

The parties undertake to resolve any discrepancies that may arise from the implementation of this agreement in a friendly manner. Should this give rise to some kind of conflict, the parties shall finally comply with the International Chamber of Commerce rules of arbitration, with the aid of an arbitrator chosen in keeping with such rules.

This Agreement is signed in four copies in the places and on the dates indicated below.

For Universidad Politécnica de Madrid

Madrid,



Rector: Prof. Dr. Guillermo CISNEROS PÉREZ

Madrid, January 10th, 2024



Director of ETSIST: Prof. Dr. Amador Miguel GONZÁLEZ CRESPO

Madrid, January 10th, 2024



MIoT program coordinator: Prof. Dr. Fernando PESCADOR DEL OSO

For Technische Hochschule Köln

Cologne, February 20th, 2024



President: Prof. Dr. Stefan HERZIG

Cologne, 2024-02-28



Dean of Fakultät 07: Prof. Dr. Stefan KREISER

Cologne, 2024-02-28



MCSN program coordinator: Prof. Dr. Uwe DETTMAR



ANNEXES TO THE AGREEMENT:

**ANNEX I. SEMESTER AND COURSE SEQUENCE FOR STUDENTS IN ITINERARY 1
(UPM AS HOME UNIVERSITY)**

**ANNEX II. SEMESTER AND COURSE SEQUENCE FOR STUDENTS IN ITINERARY 2
(THK AS HOME UNIVERSITY)**

ANNEX III. EQUIVALENCE BETWEEN GRADING SYSTEMS

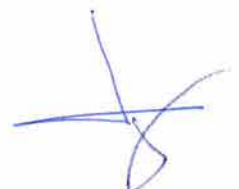


**ANNEX I: SEMESTER AND COURSE SEQUENCE FOR STUDENTS IN ITINERARY 1
(UPM AS HOME UNIVERSITY)**

1st year

MIoT Courses at UPM	Period	Credits (48+10)	Recognized MCSN courses at THK	Course type	Credits (45)
Embedded platforms and communications for IoT	FALL	4.5		Elective	5
Mobile Devices Programming	FALL	4.5		Elective	5
Sensor Networks	FALL	4.5	Kommunikation in verteilten Systemen (Communication in Distributed Systems and Networks)	Specialisation	5
Cyberphysical systems modelling	FALL	4.5		Elective	5
Distributed Systems for IoT	FALL	4.5	Zuverlässigkeit von Systemen (Reliability of Systems)	Specialisation	5
Architectures and service platforms	FALL	4.5	Next Generation Networks	Specialisation	5
Information Models	FALL	3			
Security for IoT Applications	SPRING	4.5	IT Security or Embedded Security	Specialisation	5
Big Data Applications for IoT	SPRING	4.5			
Cloud computing for IoT	SPRING	4.5			
Intelligent Applications using IoT devices	SPRING	4.5			
			Research project*	Compulsory	10


* The research project will be done during the first year at UPM, jointly supervised by UPM and THK academics, and graded according to THK regulations.



2nd year

MCSN courses at THK	Period	Credits (47)	Course type	Recognized MIoT courses at UPM	Credits (12)
Intercultural training	WINTER	2	Compulsory, proof of attendance		
Advanced Mathematics	WINTER	5	Compulsory		
Fundamentals of System- and Network Theory	WINTER	5	Compulsory		
Project Management	WINTER	5	Compulsory		
Master Thesis*		27 + 3	Compulsory	Master Thesis*	12

* The Master Thesis will be done during the second year at THK, jointly supervised by UPM and THK academics, and graded at UPM according to UPM regulations.



**ANNEX II: SEMESTER AND COURSE SEQUENCE FOR STUDENTS IN ITINERARY 2
(THK AS HOME UNIVERSITY)**

1st term at THK (Summer¹)

MCSN courses at THK	Course type	Credits (30)	Recognized MIoT courses at UPM	Credits (18)
Advanced Mathematics	Compulsory	5		
Fundamentals of System- and Network Theory	Compulsory	5		
Embedded Security, Cryptology or IT Security	Specialisation	5	Security for IoT Applications	4.5
Research Project (in the field of IoT)*	Compulsory	10	Big Data Applications for IoT + Cloud computing for IoT	9
Intelligent Information Systems	Elective	5	Intelligent Applications using IoT devices	4.5


* The research project will be jointly supervised by UPM and THK academics, and graded according to THK regulations.

2nd term at UPM (Fall)

MIoT courses at UPM	Credits (30)	Recognized MCSN courses at THK	Course type	Credits (15)
Embedded platforms and communications for IoT	4.5			
Mobile Devices Programming	4.5			

¹ Students who start the MA CSN program in the winter semester can also participate in the DD program. However, the duration of their studies is extended by one semester, as they can only start their semester at the UPM in the next winter semester. The 30 ECTS points previously required at TH Köln can then be acquired within the first two semesters of their study program.

MIoT .courses at UPM	Credits (30)	Recognized MCSN courses at THK	Course type	Credits (15)
Sensor Networks	4.5	Kommunikation in verteilten Systemen (Communication in Distributed Systems and Networks)	Specialisation	5
Cyberphysical systems modelling	4.5			
Distributed Systems for IoT	4.5	Zuverlässigkeit von Systemen (Reliability of Systems)	Specialisation	5
Architectures and service platforms	4.5	Next Generation Networks	Specialisation	5
Information Models	3			



2nd year at THK

MCSN courses at THK	Course type	Credits (45)	Recognized MloT courses at UPM	Credits (12)
	Elective*	5		
	Elective*	5		
Project Management	Compulsory	5		
Master Thesis**	Compulsory	27 + 3	Master Thesis**	12

* Students cannot choose as elective courses any that is included in this annex as "recognized MCSN courses at THK"

** The Master Thesis will be done during the second year at THK, jointly supervised by UPM and THK academics, and graded at THK according to THK regulations.

Courses offered every year may be somewhat different. They can be consulted on www.mcsn.de



ANNEX III: EQUIVALENCE BETWEEN GRADING SYSTEMS

UPM GRADING SYSTEM

In the Spanish university system, courses are graded on a scale of 0 to 10 points, with the following qualitative equivalences:

- 0.0 to 4.9 → "*Suspenso*" (Fail)
- 5.0 to 6.9 → "*Aprobado*" (Pass)
- 7.0 to 8.9 → "*Notable*" (Good)
- 9.0 to 10.0 → "*Sobresaliente*" (Excellent)

M.H.: A special mention, "*Matricula de Honor*" may be granted to up to 5% of the students in each class group provided they have got a "sobresaliente".

To pass a course is necessary to get at least 5 points

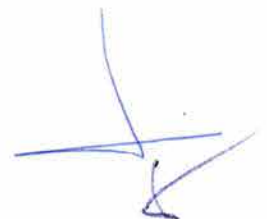
THK GRADING SYSTEM

THK grades on a 1-to-5 scale, with the following qualitative equivalences:

- 1.0 / 1.3 → "*Sehr gut*" (Very good)
- 1.7 / 2.0 / 2.3 → "*Gut*" (Good)
- 2.7 / 3.0 / 3.3 → "*Befriedigend*" (Satisfactory)
- 3.7 / 4.0 → "*Ausreichend*" (Pass)
- 5.0 → "*Mangelhaft*" (Fail)

When averaging is necessary:

- up to 1.5 → "*Sehr gut*" (Very good)
- over 1.5 to 2.5 → "*Gut*" (Good)
- over 2.5 to 3.5 → "*Befriedigend*" (Satisfactory)
- over 3.5 to 4.0 → "*Ausreichend*" (Pass)
- over 4.0 → "*Mangelhaft*" (Fail)



Accordingly, the following equivalences can be deduced:

Grade issued at UPM	Grade recognized at THK
9.6 to 10	1
9.0 to 9.5	1.3
8.4 to 8.9	1.7
7.7 to 8.3	2.0
7.0 to 7.6	2.3
6.5 to 6.9	2.7
6.1 to 6.4	3.0
5.7 to 6.0	3.3
5.3 to 5.6	3.7
5.0 to 5.2	4.0
Up to 4.9	5.0

Grade issued at THK	Grade recognized at UPM
1	10
1.3	9
1.7	8.4
2.0	7.7
2.3	7
2.7	6.5
3.0	6.2
3.3	5.8
3.7	5.4
4.0	5
5.0	Between 1.0 and 4.0