

ALLIANCE TECH

Mechanical Engineering

AGREEMENT FOR FREE-MOBILITY



www.alliance4tech.eu



Alliance 4 Tech

Vision:

Develop strategic alliance of 4 top Engineering Schools, of different European cultures, located in «global cities» in the «economic heart» of Europe, forming a European Campus without borders for their students and their faculty

- With common values
- Promoting common programmes and providing students with the opportunity to spend one or two terms in partner universities
- Encouraging exchange of faculty members
- Sharing critical technological infrastructures to ensure critical mass
- With a common strategy towards emerging countries (joint promotion, shared locations)

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Values:

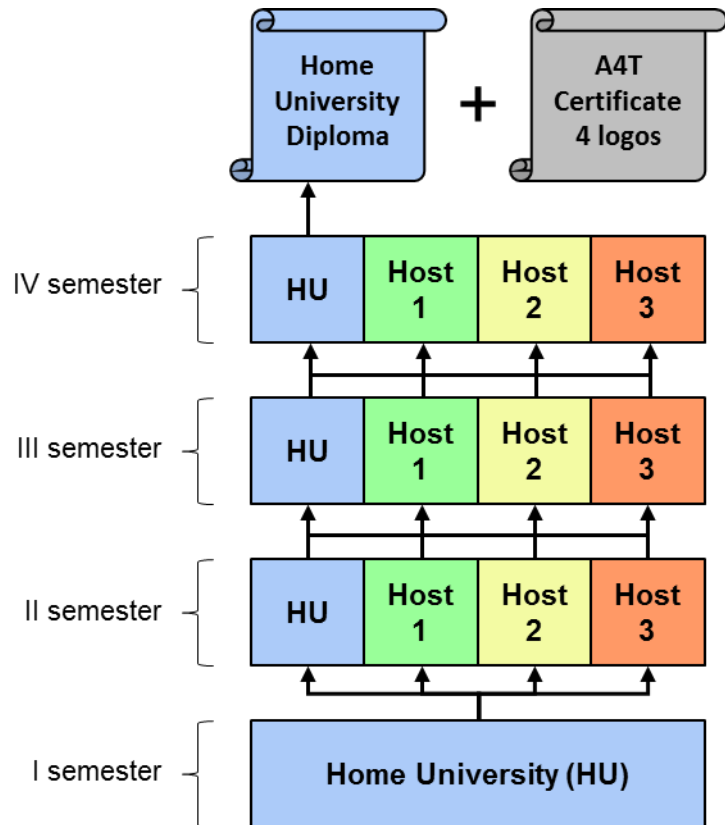
Through their joint actions, the values promoted by the Alliance are the following:

- Innovation and Entrepreneurship
- Leadership and Creativity
- Social Responsibility and Ethics
- Cultural Diversity and International Environment

Alliance 4 Tech - Mechanical Engineering

Free-mobility MSc courses

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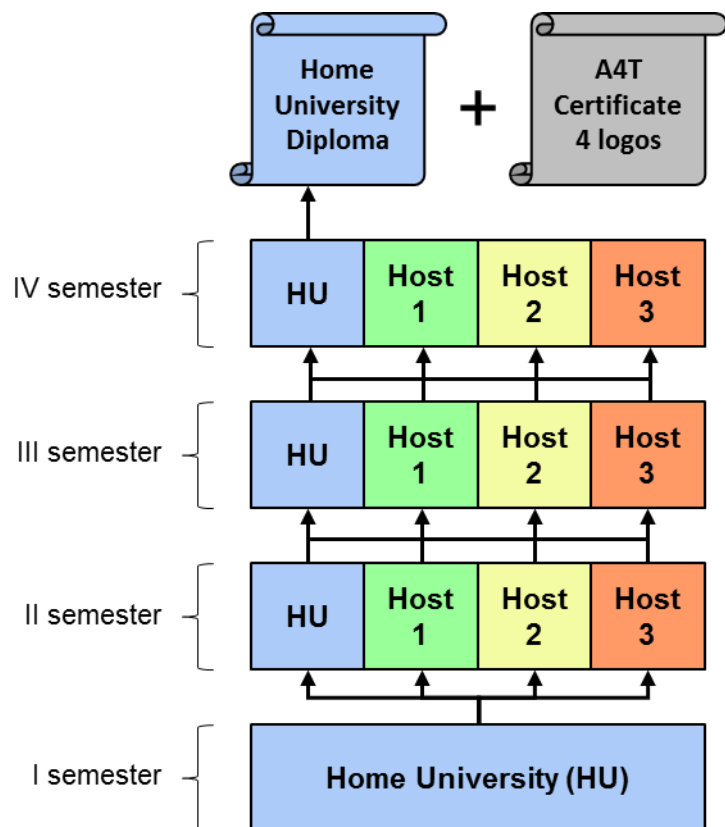


- Students enrolled in any of the partner universities are entitled to take **up to 60 credits (ECTS) from the other institutions**
- Graduates will receive their standard Diploma from their Home University plus a **Joint Programme Certificate** with the 4 logos and the signature of the 4 Rectors

Alliance 4 Tech - Mechanical Engineering

Free-mobility MSc courses

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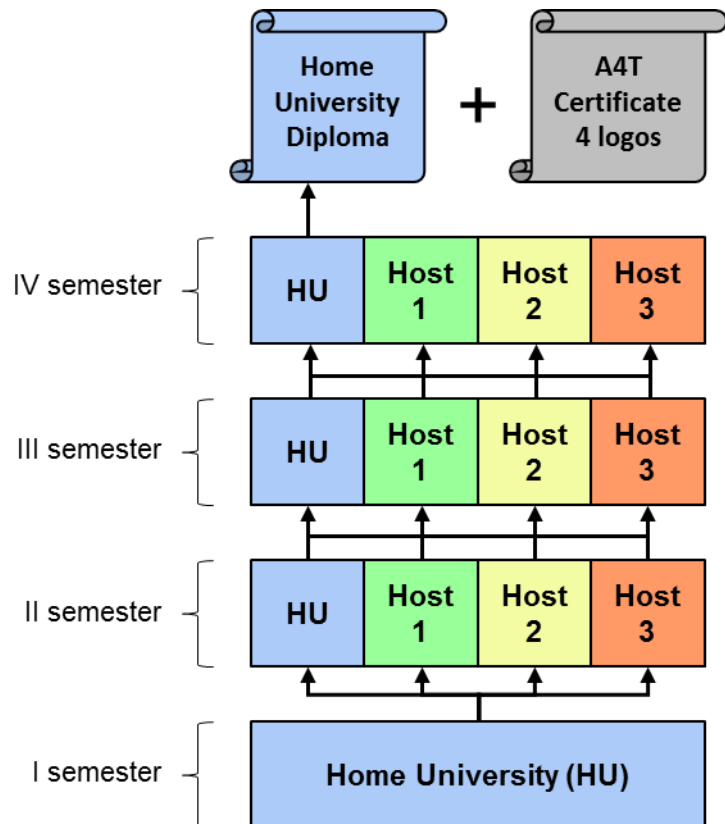


- The “Alliance4Tech Certificate” shall be awarded to students selected for the A4T mobility programme who must fulfil the following requirements:
 - They have spent a **visiting period abroad in at least 2 partner institutions** of the A4T programme;
 - They have gained **at least 30 ECTS abroad**;
 - They have gained **at least 6 ECTS in each visited institution.**

Alliance 4 Tech - Mechanical Engineering

Free-mobility MSc courses

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- The number of participants will be limited to a maximum of **ten students** from each university per year **in addition to already existing standard Erasmus agreements**
- Students are encouraged to have **master thesis supervisors from at least two universities**. The thesis must be written in English and has to follow the examination regulations of the home University

Alliance 4 Tech - Mechanical Engineering

220 shared courses (1248 ECTS)

131 (60%) taught in English

Institution	Lecturing Period	Exam Session	Notes
PM	October-January	February	
	March-June	July	
		September (extra)	
CS	September-January	January	M1
	February-June	June-July	M1
	September-March	April	M2
TUB	October-February	February-March	
	April-July	July-September	
UCL	September-February	March	
		May-September (Project)	



Overall structure:

62 ECTS – grounding (mandatory) courses

16-20 ECTS – track (mandatory) courses

18-22 ECTS – track (elective) courses

20 ECTS – master thesis

<http://www.ccsmecc.polimi.it/en/presentation/laurea-magistrale-equivalent-to-a-msc/>

Mechanical Engineering (Politecnico di Milano)

1st year: Fundamentals (grounding mandatory courses)	ECTS
Control and Actuating Devices for Mechanical Systems	9
Applied Metallurgy	6
Energy Systems LM	7
Advanced Manufacturing Processes	10
Machine Design 2	10
Mechanical System Dynamics	5
Measurements	5
Design and Management of Production Systems	10
2nd year: 8 possible concentrations	
<i>Production Systems</i> (project management, manufacturing systems, etc.)	38
<i>Mechatronics and Robotics</i> (mechatronic systems, automation and control of machines/robots/vehicles, etc.)	38
<i>Virtual Prototyping</i> (tools & methodologies for virtual prototyping, design methods, etc.)	38
<i>Internal Combustion Engines and Turbomachinery</i> (energy systems, thermodynamic and fluid dynamics of combustion engines and turbomachinery, etc.)	38
<i>Advanced Mechanical Design</i> (design and computational methods, mechanical systems reliability, etc.)	38
<i>Advanced Materials and Technology</i> (steelmaking, innovative materials, advanced manufacturing processes, etc.)	38
<i>Ground Vehicles</i> (vehicle dynamics and control, vehicle design, etc.)	38
<i>Machine Tools and Manufacturing Systems</i> (machine tools, manufacturing systems, automatic control, etc.)	38
Master thesis	20

Duration	2 years
Calendar	Oct/Jan – Mar/June
Course size (≈)	5-10 ECTS
Workload (≈)	120 ECTS
Enrolments (≈)	400 (MSc only, per year)

Admissions:

- Bachelor degree, transcripts, English certification

Notes:

- Entirely taught in English
- About 20% of international students
- 77 courses (MSc only)
- 212 Faculty members (BSc+MSc)
- Experimental and computation activities included in most of the MSc courses
- Full-lab courses available

[LINK](#)



Overall structure:

MSc Mechanical Engineering

MSc Power Systems Engineering

45 ECTS – mandatory courses

7.5 ECTS – track (elective) courses

37.5 ECTS – master thesis

Mechanical Engineering (University College London)

Courses	ECTS
MECHGN01 Ship Dynamics	15
MECHGN02 Ship Structures	15
MECHGN03 Ship Hydrodynamics	15
MECHGM01 Applied Thermodynamics & Turbomachinery	7.5
MECHGM02 Power Transmission & Auxilliary Machinery Systems	7.5
MECHGM03 Materials & Fatigue / Fracture Analysis	7.5
MECHGM04 Vibrations, Acoustics & Control	7.5
MECHGM05 Advanced Computer Applications in Engineering	7.5
MECHGM06 Heat Transfer & Heat Systems	7.5
MECHGM11 Electrical Machines and Power Electronic Systems	7.5
MECHGR12 Electrical Power Systems and Electrical Propulsion	7.5
MECHG020 New & Renewable Engineering Systems	7.5

Duration	1 year (12 months)
Calendar	Oct-Mar (taught) Apr-Sep (project)
Course size	7.5/15 ECTS
Workload	90 ECTS
Enrolments	60-70 MSc, per year

Admissions:

- Bachelor degree, transcripts, English certification, references x2

Notes:

- Entirely taught in English
- About 60% of international students
- 12 courses available (MSc only)
- 40 Faculty members (BSc+MSc)
- Experimental and computation activities not included in most of the MSc courses
- Projects and full-lab courses not available

[LINK](#)

Mechanical Engineering (University College London)

UCL			
SEM	CODE - COURSE	LANG.	ECTS
1	MECHGN01 Ship Dynamics	Eng	15
1	MECHGN02 Ship Structures	Eng	15
1	MECHGN03 Ship Hydrodynamics	Eng	15
1	MECHGM01 Applied Thermodynamics & Turbomachinery	Eng	7,5
1	MECHGM02 Power Transmission & Auxilliary Machinery Systems	Eng	7,5
1	MECHGM03 Materials & Fatigue / Fracture Analysis	Eng	7,5
1	MECHGM04 Vibrations, Acoustics & Control	Eng	7,5
1	MECHGM05 Advanced Computer Applications in Engineering	Eng	7,5
1	MECHGM06 Heat Transfer & Heat Systems	Eng	7,5
1	MECHGM11 Electrical Machines and Power Electronic Systems	Eng	7,5
1	MECHGR12 Electrical Power Systems and Electrical Propulsion	Eng	7,5
1	MECHG020 New & Renewable Engineering Systems	Eng	7,5

Mechanical Engineering TU Berlin

30 ECTS LP: Specialisation Elective Module

36 ECTS LP: Profile Elective Module

24 ECTS LP: Free Elective Module

6 ECTS LP: Project

6 ECTS LP: Internship

18 ECTS LP: Master Thesis

Duration	2 years
Calendar	Oct/Feb – Apr/Jul
Course size (≈)	6 - 12 ECTS
Workload (≈)	120 ECTS
Enrolments (≈)	300 (MSc Mech. Eng.)

Admissions:

- Bachelor degree, transcripts, German certification

Notes:

- Taught in German and English
- About 20% of international students
- More than 77 courses (MSc only)
- 12 Departments in Mech. Eng. (BSc+MSc)
- Experimental and computation activities included in few of the MSc courses
- Full-lab courses available
- Internship in industry or research institution

Mechanical Engineering TU Berlin



	TUB				
(YR.)	SEM	DEPT.	CODE - COURSE	LANG.	ECTS
1./2.	W./S.	35351100	50364 - Integrative Product Development	Ger	6
1./2.	W.	35361500	50147 - Applications of industrial Information Technology	Ger	6
1./2.	W./S.	35351300	50459 - Sustainable Product Engineering	Ger	6
1./2.	S.	35351200	50170 - Design against Stress and Vibrations	Ger	6
1./2.	S.	35351300	50388 - Cost Management and Law in Product Development	Ger	6
1./2.	S.	35351400	50232 - Elements of Mechatronics	Ger	6
1./2.	S.	35351200	50158 - Balancing Techniques	Ger	6
1./2.	W.	35351200	50276 - Strength and Fatigue	Ger	6
1./2.	S.	35371400	50515 - Project Multi-Body Dynamics	Ger	6
1./2.	W.	35371400	50384 - Continuum Dynamics	Ger	6
1./2.	W.	35351100	50572 - Simulation of Mechatronical Systems	Ger	6
1./2.	W.	35351200	50549 - Rotor Dynamics	Ger	6
1./2.	W.	35351300	50315 - Gear Technologies	Ger	6
1./2.	S.	35351200	50170 - Design against Stress and Vibrations	Ger	6
1./2.	S.	35361700	50632 - Micro- and Nanotechnology	Ger	6
1./2.	W.	35361700	50300 - Functional Components of Mikrotechnology I	Ger	6
1./2.	S.	35361100	50301 - Functional Components of Mikrotechnology I	Ger	6
1./2.	W.	35311100	50641 - Wind Energy - Fundamentals	Ger	6
1./2.	W.	35311100	50590 - Fluidflowmachine - Components	Ger	6
1./2.	S.	35311100	50589 - Fluidflowmachine - Design	Ger	6
1./2.	S.	35311100	50297 - Fluid System Dynamics- Operation	Ger	6
1./2.	W.	35314100	50006 - Fundamentals of Combustion	Ger	6
1./2.	S.	35314100	50007 - Combustion dynamics	Ger	6
1./2.	S.	35311700	50067 - Combustion kinetics	Eng	6
1./2.	S.	35341500	50381 - Design of Turbo Machinery	Ger	6
1./2.	W.	35341500	50613 - Turbomachinery II - Aerodynamics of Turbomachinery	Ger	6
1./2.	W.	35341500	50403 - Basics of Aeroengines	Ger	6
1./2.	S.	35341500	50404 - Specialization Aeroengines	Ger	6
1./2.	S.	35341500	50612 - Basics of Turbomachinery	Ger	6
1./2.	W.	35314100	50006 - Fundamentals of Combustion	Ger	6
1./2.	W.	35331100	50027 - Fluid Dynamics in Combustion Engines	Ger	6
1./2.	W.	35331100	50026 - Turbochargers	Eng	6
1./2.	W.	35331100	50630 - Internal Combustion Engines 2	Ger	6
1./2.	S.	35331100	50614 - Thermodynamics in Combustion Engines	Ger	6

	TUB				
SEM	DEPT.	CODE - COURSE	LANG.	ECTS	
S.	35331100	50629 - Internal Combustion Engines 1	Ger	6	
W./S.	35361300	50020 - Datenanalyse bei cyber-physischen Systemen	Ger	6	
S.	35361500	50327 - Basic Principles of industrial Information Technology	Ger	6	
W./S.	35361400	50160 - Automation Engineering	Ger	6	
W./S.	35361100	50494 - Production Technology	Ger	6	
S.	35361100	50172 - Bearbeitungssystem Werkzeugmaschine II	Ger	6	
W./S.	35361200	50457 - Assembly Technology	Ger	6	
S.	35314100	50011 - Project in thermo-fluid dynamics	Ger	6	
W./S.	35374100	50002 - Project Modelling lightweight structures	Ger	6	
W./S.	35371300	50022 - Experimental Practice in Mechanics	Ger	6	
W./S.	35331100	50018 - Project Power Train Systems	Ger	6	
W./S.	35361500	50530 - Project Virtual Product Creation	Ger	6	
W./S.	35351100	50521 - Product Development Project	Ger	6	
W./S.	35361300	50537 - Quality Management Project	Ger	6	
W./S.	35361400	50161 - Project automation engineering	Ger	6	
W./S.	35351300	50510 - Project Machinery System Design	Eng	6	
W./S.	35311100	50299 - Fluid System Dynamics - Project	Ger	6	
W./S.	35361200	50496 - Production Technological Project	Ger	6	
W.	35371200	50528 - Project "Simulation of tribological contacts"	Ger	6	
W./S.	35351400	50500 - Project actuators and sensors / master	Ger	6	
S.	35351200	50509 - Engineering Design, Structure and Rotor Dynamics Project	Ger	6	
W./S.	35351600	50514 - Project Medical Device Technology	Ger	6	
S.	35371200	50525 - Project Friction Physics	Ger	6	
W./S.	35371100	50527 - Project Simulationtools and their application	Eng	6	
W.	35371400	50465 - Nonlinear and Chaotic Oscillations	Eng	6	
W.	35341400	50287 - Flight Control	Eng	6	
W.	35365300	50055 - Total Supplier Management	Eng	6	
W.	35365300	50056 - Einführung in die Automobilindustrie	Eng	6	
W./S.	35311100	50068 - Flow Measurement Methods	Eng	6	
S.	35331900	50458 - Multi-agent transport simulation	Eng	6	
S.	35321200	50463 - Project Neuroergonomics	Eng	6	
W.	35321200	50142 - Project Psychophysiology	Eng	6	
W.	35371100	50329 - Fundamentals of Continuum Theory I	Eng	6	
S.	35371100	50330 - Fundamentals of Continuum Theory II	Eng	6	

60 ECTS M1: Grounding courses

60 ECTS M2:

40 ECTS Elective courses

20 ECTS Master thesis

Industrial Engineering Centrale Supélec



CentraleSupélec

Duration	2 years
Calendar	M1: Sep/Jan – Feb/Jun M2: Sep/Mar
Course size (\approx)	3 ECTS
Workload (\approx)	120 ECTS
Enrolments (\approx)	150 students

Admissions:

- ...

Notes:

- 40 courses offered to A4T students, 25 in English (MSc only)

Industrial Engineering Centrale Supélec



CS			
SEM	CODE - COURSE	LANG.	ECTS
1	EN1110 - Advanced Heat Transfer	Eng	3
2	EN1120 - Heat Transfer	Eng	3
2	EN1201 - Fluid Mechanics	Eng	3
2	EN1500 - Nuclear Energy	Eng	3
2	EN1600 - Renewable Energy	Fr	3
2	EN1700 - Intro to neutronics	Fr	3
2	EN1800 - Numerical Methods	Eng	3
1,2	EN1920 - Aerodyn & Energy labs	Eng-Fr	2
1, 2	EN2910 - Aircraft design	Eng	3
2	EN2930 - Powertrain design	Fr/Eng	3
1	EN2940 - Electrical aircraft	Fr/Eng	3
1	MA2610 - Scientific computation	Fr	3
2	MA2620 - ODE & dynamics systems	Fr	3
2	MA2814 - Intro to random modelling	Eng	3
2	MA2826 - Discrete Math for systems	Fr	3
1, 2	MG1200 - Civil Eng	Fr	3
1	MG1300 - Structural Dynamics and Acoustics	Eng	3
1	MG1400 - Mechanical behaviour of materials	Fr	3
2	MG1500 - BioMechanics	Fr	3
1	MG1600 - Nanomechanics	Eng	3

CS			
SEM	CODE - COURSE	LANG.	ECTS
1	MG1700 - Maintenance of a railroad way	Fr	3
2	MG2812 - Introduction to acoustic	Fr	3
2	MG2814 - Economics and design of dams	Fr	3
2	MG2815 - Soil and granuler materials	Fr	3
2	MG2816 - MEMS	Fr	3
2	MG2817 - Application of finite elt methods	Eng	3
2	MG2818 - Oil & Gas explo and production	Eng	3
2	MG2910 - Sustainable buildings and architecture lab	Fr	3
2	MG2920 - Powertrain design	Eng	3
1	PH2100 - Waves	Eng-Fr	3
1	PH2200 - Synchrotron	Eng	3
1	PH2250 - Nuclear reactor	Fr	3
1	PH2300 - Structure of matter	Eng-Fr	3
1	PH2450 - Chemistry for industry	Eng	3
2	PH2813 - Advanced material for ICT	Eng	3
2	PR1100 - Introduction to Materials	Eng	3
1, 2	PR3100 - Chemical Eng	Eng	3
1, 2	PR4300 - Cogeneration and energy production	Eng	3
2	SE2650 - Risk assessment & Mngnt	Eng	3
1, 2	WP5200 - Innovation Project	Eng	9