

# 2<sup>nd</sup> level Specializing Master Course in Rotary Wing Technologies Edition 2014-15

POLITECNICO DI MILANO



Dipartimento di  
Scienze e Tecnologie Aerospaziali



2nd level Specializing  
Master Course in Rotary Wing Technologies  
Politecnico di Milano  
Department of  
Aerospace Science and Technology  
Via La Masa, 34  
20156 MILANO - Italy

## Director:

Prof. Cesare Cardani  
Tel. +39.02.2399.8341  
Email: [cesare.cardani@polimi.it](mailto:cesare.cardani@polimi.it)

## For further information:

Email: [rotorcraft.course@aero.polimi.it](mailto:rotorcraft.course@aero.polimi.it)  
[www.aero.polimi.it](http://www.aero.polimi.it)



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## 2nd level Specializing Master Course in Rotary Wing Technologies - Edition 2014-15

Organized by:

### Dipartimento di Scienze e Tecnologie Aerospaziali del Politecnico di Milano

#### 1. PURPOSE

Rotorcraft in their conventional configuration are rapidly growing in different tasks and missions all over the world. Unconventional rotorcraft, such as tilt rotors and compounds, experience a very positive development leading to new families of vehicle able to extend the traditional helicopter application boundaries.

In coming years rotorcraft manufactures will face significant challenges both in government and civil demand, that will be coped through a mix of technological innovations, product lines, new materials and processes. However those ambitious aims cannot be achieved without a new wave of technically competent persons able to manage properly those technological challenges.

The Master Course will provide the participants with a sound theoretical knowledge of all the characteristics, problems and solutions of rotorcraft and tilt rotors followed by a practical internship period with the tuition of experienced industry personnel. At the end of the Course, students will be familiar with all the aspects of the rotorcraft world, from the design and development to the most advanced manufacturing and servicing methods. The topics include also marketing and commercial consideration within customer different applications. The Master Course therefore is intended to prepare young professionals for rapid and qualified introduction in the rotorcraft scenarios filling a gap and building a bridge between academy and working world.

#### 2. PROGRAM

##### Module 1: Rotorcraft Description and Basic Theory

History of helicopters, helicopter and tilt rotors components basic description and functioning, Rotor types, Hub types, Avionics, Monitoring, Communications and navigation system, Mission systems, Survivability, Maintenance and blade element theory for hover and forward flight, Helicopter performance, Unsteady aerodynamics, Rotor wakes, Aeroacoustics, Computational methods, Rotor aerodynamics in ground effect, Brown out, Helicopter Icing, Noise and vibration, Active and passive vibration reduction.

##### Module 2: Helicopter Definition and Basic Design

Configuration definition and layout, Helicopter definition design methods, Rotor general design sizing, Rotor types, Hub types, Rotor blades, Blade section analysis and stiffener evaluation, Helicopter handling qualities, Power requirements and supply, Engines for helicopters.

##### Module 3: Helicopter Design and Development

Safety, Risk assessment and human factor, Helicopter certification including civil and military methodologies, Structural design and tools, Design of composites structures, Static and fatigue tests, Fatigue analysis: Fail safe, Safe life, Damage tolerance, Flaw tolerance, Drive train, Crashworthiness, Health and usage monitoring, Development test for gearbox and dynamic systems, Airframe systems, Environmental tests for airframe systems, Electro avionic systems, Automatic Flight Control Systems AFCS.

Flight mechanic simulator, Flight testing, Prototypes instrumentation and flight data acquisition, Handling qualities and AFCS flight tests, Airfield performance, Icing flight tests, Helicopter steady performance, Hot & high and cold flight tests, Helo-ship interface flight test, Helicopter flight manual.

##### Module 4: Helicopter Manufacturing

Production planning and control, Materials, Virtual manufacturing, Manufacturing management, Airframe system manufacturing, Airframe manufacturing, Transmission manufacturing, Composites, Rotors and blades manufacturing, Non destructive testing, Final assembly, Trouble shooting, The case of NH90 multinational manufacturing, AW 609 Tilt Rotor, Vendor solution and qualification, Procurement specification, Quality assurance, Quality control, Quality company organization, Marketing and sales.

Civil operation: JAR OPS, Helicopter and their operations, helicopter usage and comparison with customer expectations.

##### Module 5: Customer Service and Training

Customer support and service helicopter life cycle and company organization, Customer support management, Field service engineering, Spares and logistics, Global perspective for maintenance. Flight crew and maintenance people training, Flight and maintenance simulators.

The Course is supported by a number of shop and laboratory visits at Politecnico and in AW during the module activities timing consistent with the matter treated.

During the Course a number of examination proficiency sessions is established. A final examination will be held in connection with the activities carried out during internship in AW. A report is to be produced. A five month internship specifically designed for each student will follow at the end of the front lessons. A personal tutor will be assigned according to the field of activity, which will be carried out in a number of AW Departments.

#### 3. TITLE OF STUDY REQUESTED

A Master of Science (Laurea Magistrale) in Aeronautical, Space, Aerospace, Mechanical, Electronic or Electrical Engineering is required. For graduated abroad candidates equivalent study titles in the respective educational institutions will be considered. The Admission Board will select the students to be accepted.

Enrolment requests should be received by the end of January 2014.

A maximum of 25 students will be admitted.

#### 4. FEE

Total costs: € 5.500 (€ 5.000 tuition fee plus € 500 enrolment fee) to be paid in two instalments.

#### 5. SCHOLARSHIPS

Scholarships covering the whole tuition fee or a part of it will be made available by AgustaWestland. They will be assigned by the Admission Board after the expiration of the enrolment deadline and within February 15<sup>th</sup> 2014.

#### 6. BEGINNING AND END OF THE COURSE

February 17<sup>th</sup> 2014 - January 30<sup>th</sup> 2015.

#### 7. LOCATION

Politecnico di Milano, Bovisa Campus, Via La Masa 34, Milano  
AgustaWestland, Via G. Agusta 520, Cascina Costa di Samarate (VA)