CC3 Defence and Security

LEARNING OBJECTIVES

The Defence and Security program is designed to cultivate mechanical engineers with interdisciplinary and multidisciplinary skills in national defence and civil/industrial security. This encompasses a broad spectrum of cultural domains, from mechanical to computer engineering, from component design to integrated systems, and from manufacturing to the deployment of machinery and facilities. Consequently, students in this program must engage in specialized coursework beyond the foundational master's curriculum in mechanical engineering. This includes ballistics, explosives, impact engineering, autonomous vehicle technology, and data analysis. Additionally, they are expected to undertake some software and computer architecture security courses. Furthermore, students are presented with various elective courses to deepen their industrial and computer science expertise. These elective offerings cover multiple subjects, including non-destructive testing, Failure Analysis, augmented reality, image recognition, risk management, geopolitics, game theory, cryptography, cybersecurity, and computer forensics.

PRE-REQUISITES

Students opting for the Defence and Security program are not required to fulfil any specific prerequisites. However, a strong foundation in basic skills (in the areas of chemistry, physics, and mathematics) is recommended. Additionally, a thorough understanding of materials, machine design, and applied mechanics and the curiosity to tackle and solve complex, interdisciplinary, and multidisciplinary problems is advised.

CC3 Defence and Security

LEARNING OUTCOMES

The mechanical engineer specializing in Defence and Security is a highly versatile professional with a broad cultural background. Their in-depth exploration of related disciplines, spanning from computer science to cybersecurity and from impact engineering to explosives, equips them with the capability to address intricate theoretical and practical challenges within mechanical engineering. This expertise extends seamlessly across conventional domains and into cutting-edge applications.

JOB OPPORTUNITIES

The interdisciplinary nature of the Defence and Security program enables students to pursue employment opportunities in companies involved in the design, development, and production of systems and products for national defence, as well as for civil and industrial security, mainly focusing on mechanical and computer-related aspects. In practical terms, virtually any company may require mechanical engineers with expertise in defence and security.

PARTNER UNIVERSITIES

The Defence and Security program is newly established and, by its very nature, focuses on specific research areas. It fosters collaborations with prestigious national institutions such as the Carabinieri and the Italian Army and internationally renowned companies like Leonardo. Exchange partnerships are also available with esteemed universities such as Fraunhofer-Institut für Werkstoff- und Strahltechnik (IWS, Germany), Luleå Tekniska Universitet (LTU, Sweden), Conseil Européen pour la Recherche Nucléaire (CERN, Switzerland), École Polytechnique Fédérale de Lausanne (EPFL, Switzerland), Technische Universiteit Delft (TU Delft, The Netherlands), and University of Nottingham (UoN, UK).

CC3 Defence and Security

1 YEAR COURSES
60 ECTS

40 ECTS

	ECTS
Energy Conversion Technologies	5
Dynamics of Mechanical Systems	5
Machine Design	5
Advanced Manufacturing Processes B	5
Advanced Project Management	10
Advanced Materials for Industrial Engineering	10

10 ECTS

	ECTS
Fondamenti di balistica ed esplosivistica	10

10 ECTS

	ECTS
Control of Mechanical Systems	5
Data Analysis for Future Transportation Systems	5
Geopolitica per la Difesa e la Sicurezza	5

CC3 Defence and Security

2 YEAR COURSES

40 ECTS + 20 ECTS Master's Thesis

10 ECTS

	ECTS
Autonomous Vehicles	5
Impact Engineering	5
Design and Analysis of Experiments	5

5 ECTS

	ECTS
LAB - Balistica forense	5

CC3 Defence and Security

25 ECTS

	ECTS
Non-Destructive Testing and Evaluation for Materials and Components	5
Additive Manufacturing for Space and Aerospace Applications	5
Vision Based 3D Measurements	5
XR Applications for Engineering	5
Technology Risk Governance	5
Computational Fluid Dynamics - Experimental Assessment	5
Autonomous Vehicles	5
Impact Engineering	5
Design and Analysis of Experiments	5
Control of Mechanical Systems	5
Data Analysis for Future Transportation Systems	5
Geopolitica per la Difesa e la Sicurezza	5
Failure Analysis, Sicurezza Industriale e Ingegneria Forense	5
Materials and Siluation Tools for Sustainable Processes	5

CC3 Defence and Security

25 ECTS

	ECTS
Security and Resilience of Critical Infrastructures	5
Digital Technology	5
Software Engineering 2	5
Technology for Information Systems	5
Algorithmic Game Theory	5
Computer Security	5
Digital Forensics and Cybercrime	5
Offensive and Defensive Cybersecurity	5
Cryptography and Architectures for Computer Security	5
Open Course	5