

I CORSO	TS1 - SUPERIOR TECHNICIAN FOR RAILWAY INFRASTRUCTURE MAINTENANCE - SECURITY				CFU
	DISCIPLINE DI BASE	TEORIA	LAB.	Contenuti	
Mod.1/ITS	Lingua Inglese e Comunicazione in Inglese	60	60	Dedicated to the study and strengthening of grammatical structures required by the B2 level CEFR. The module focuses on the main grammatical structures of the English language. The oral-communicative aspect and communication in 12 are privileged. Students are involved in activities of Brain storming, Role play, Pair work and in exam simulations. From an operational point of view, the first semester levels the class skills in order for an admission to a 5th or 6th level.	8,4
Mod.2/ITS	Gestione delle informazioni e informatica (divisa in due sub moduli per ECDL base e avanzato) Raggiungimento Certificazione ECDL avanzata	50	50	Knowledge and skills useful to access the world of work more easily and to live active citizenship. It includes the following modules: Fundamentals of Information Technology / IT basic concept-Management of basic functions of the operating system / O.S. Basic Management - Word Processing / Word Processing - Spreadsheet / Spreadsheet - Databases / Structured Data Management - Multimedia Presentations / Slideshows - Internet & Networking.	7,0
Mod.3/ITS	Matematica	50	20	Analytical geometry - elements of algebra - Derivatives - Trigonometry - Complex numbers - Functions - Integrals - Descriptive statistics - General concepts on sets - geometric and exponential functions	5,8
Mod.4/ITS	Fisica - Teoria della misura e dell'errore	40	20	Kinematics - Dynamics - Forces - Static - Friction - Diagram of motion with Excel - electrodynamics - thermodynamics - fluid dynamics - the uncertainty of a measurement - in-depth analysis of measurements and errors - Directly proportional quantities - insights on "dimensioning" measurement - use of measurement tools mechanical and electrical measurement	4,8
Mod.5/ITS	Sicurezza nei luoghi di lavoro. Raggiungimento affidato corso	35		Community and national legal principles - Safety figures - Work environments and transversal risks - Physical risks - Safety risks - Safety on construction sites - Competent doctor and Health Surveillance - Notions of communication techniques	3,5
Mod.6/ITS	Elettrotecnica	50	20	Definitions and circuit parameters - Complex numbers - Power and power factor correction - Network theorems - Polyphase systems - Direct and alternating current measurements - Resistance measurements - Power, voltage and current measurements in three-phase systems	5,8
TOTALE		285	170		35,3

secondo semestre	DISCIPLINE DI BASE				CFU
	DISCIPLINE DI BASE	TEORIA	LAB.	Contenuti	
Mod.07/ITS	Lingua Inglese e Comunicazione in Inglese	60	60	In the second semester, the class is admitted to take a 7th level and in cases of reward for the student an 8th corresponding to a level	8,4
Mod.08/ITS	Gestione delle informazioni e informatica (divisa in due sub moduli per ECDL base e avanzato) Raggiungimento Certificazione ECDL avanzata	50	50	Knowledge and skills useful to access the world of work more easily and to live active citizenship. It includes the following modules: Fundamentals of Information Technology / IT basic concept-Management of basic functions of the operating system / O.S. Basic Management - Word Processing / Word Processing - Spreadsheet / Spreadsheet - Databases / Structured Data Management - Multimedia Presentations / Slideshows - Internet & Networking.	7,0
Mod.09/ITS	Mechanics e Elementi di disegno tecnico e Sistemi CAD	30	30	Elements of applied mechanics - Materials - CAD systems - Elementary graphic representation - Theory of industrial mechanical design	4,2
Mod.10/ITS	Macchine e impianti elettrici	30	9	Electrical systems - Single-phase transformers - Three-phase transformers - Asynchronous machine - Synchronous machine - Direct current machine - Components of electrical systems - MV and LV distribution systems	3,4
Mod.11/ITS	Elettronica di potenza ed Azionamenti Elettrici	20		Codes and operations in binary - Combinational networks - LEDs and displays - PLC - Triistor converters	2,0
Mod.12/ITS	Comunicazioni digitali, elettronica digitale	20		Codes and operation in binary - Combination networks - Led and Display - Memories - Programmable logic controllers	2,0
Mod.13/ITS	Mechanica della locomozione e la ferrovia dell'ambiente	20		Equilibrium in the system rotates away - The mechanics of traction - The railway market - Efficiency and environment - The demand - Objectives of effectiveness, efficiency and quality	2,0
Mod.14/ITS	Gestione della manutenzione ed affidabilità dei sistemi	20		Maintenance policies and strategy - Maintenance - Maintenance management system - Maintenance costs Information systems for maintenance	2,0
Mod.15/ITS	Normative e organizzazione ferroviaria	20		Normative basis of VTS (Independent Safety Assessment) / NoBo (Notified Bodies) activities and, in general, activities of the O&M (Inspection Bodies) and CBs (Certification Bodies) in the railway sector - National safety authorities - ANSF - Tasks and operation - Introduction to the EU legislation for railway safety and interoperability - Inspection / Certification Bodies: VTS, NoBo, SRM - Certification Bodies - Regulatory basis and accreditation of the CBs and CEs: VTS / CEI 1200 and 101 / CEI 12065 - Subjects - Maintenance Managers. Legislation (Reg. (EU) 445/2011 and Directive 2004/49/EC) - Introduction to the activities carried out by ISARail SpA as VTS / NoBo / CB SRM (2/3 cases to be selected, relating to approvals, technical admissions, SRM certifications, etc...)	2,0
Mod.16/ITS	Aspetti giuridici e organizzativi dell'impresa	10		Notions of business economics - The Budget	1,0
Mod.17/ITS	Contrattualistica	10		The employment relationship: genesis and deepening of the employment relationship - The paycheck - Analysis and comparison of the national collective labor agreements tourism and transport - The company: disciplinary code, operating regulations, staff	1,0
Mod.19/ITS	Fisica Tecnica (Fluidodinamica, Termodinamica e ...)	20		Sistemi termodinamici - Cicli diretti a gas - Cicli inversi - Aria Umida - Trasmissione del calore - L'equilibrio dei fluidi - Il moto dei gas - Pompe e compressori	2,0
TOTALE		310	149		37,0

terzo semestre	Percorso Impianti di sicurezza		NUMERO DI CREDITI III SEMESTRE 30		CFU
	Normativa e procedure operative	Dispositivi e Sistemi di Segnalamento			
M1/S/UDI	Normativa e procedure operative	32		characteristics. • Contents of the technical regulations relating to abbreviations and graphic signs for the schematic plans and circuits of railway signaling systems. • Contents of the legislation relating to the location of signals. • Instructions for operating the locking systems. • Instructions for the operation of the central systems. • Education for the exercise of IS.	3,2
M2/S/UD2	Dispositivi e Sistemi di Segnalamento	64		• Notes on the main components and devices of signalling systems. • Notes on the various types of signalling systems (Station equipment, PL, Train spacing) • Notes on the TS return circuit and interference with IS systems. • Types, characteristics and functions of central systems (ACEB). • Types, characteristics and functions of Bca plants. • Types, characteristics and functions of special systems (PAA+PL). • The schematic plan and the conditions table. • Mechanical and electrical safety connections. Blocking and release. • Notes on the characteristics of Q.L. levers, push-button panels.	6,4
M2/S/UDI	Normativa e procedure operative	32		• Contents of the technical regulations relating to abbreviations and graphic signs for the circuits of railway signaling systems • Contents of the technical regulations relating to devices and components, in particular for functionalities and technical characteristics. • Contents of the technical regulations relating to abbreviations and graphic signs for the circuits of railway signaling systems. • General examination of the basic diagrams and standard drawings relating to signalling devices and systems. • Concept and operation of the automatic observation of a signal.	3,2
M2/S/UD2	Dispositivi e Sistemi di Segnalamento	24		• Notes on the characteristics of Q.L. levers, push-button panels, PL control boxes and switches, switch stops, key transmitters, linkages. • Characteristics and type of Relay 558, 558c, compact coils, combiners and diodes. • Features and functions of Timers, Flashers and Snap Switches. • Checks and checks of electrical circuits. • Characteristics of light signals, screen relays and dichroic mirrors: operation, power supply, control. • Characteristics of the auxiliary light signals: operation, power supply, control • Relay cabinets with 1, 2 and 3 ginning orders: AMP and Burner connectors, cable lugs, counterplates, frame and units, conductors, wiring, terminal blocks. • Sectioning and sorting boxes, connection diagrams. • Alarms available on the terminal board and their connection available to the central devices. • Rating groups: constitution, operation and regulations. • Normal checks, inspections and maintenance of equipment and systems. • Abnormalities that may occur more frequently and measures to be taken to prevent them or to locate or eliminate them. • The electrical circuits relating to safety and signalling systems. Insertion of electrical conditions in circuits. Safety criteria adopted in the realization of the circuits. • The protection of the circuits with regard to the regularity and safety of operation. • Reading and interpretation of the wiring diagrams relating to safety and signalling systems.	2,4
M3/S/UDI	Normativa e Procedure operative	16		• Contents of the technical regulations relating to devices and components, in particular for functionalities and technical characteristics. • Contents of maintenance and equipment manuals. • General examination of the basic diagrams and standard drawings relating to signalling devices and systems.	1,6
M3/S/UD2	Dispositivi e Sistemi di segnalamento	64		calibration and adjustment. • Switches with electric maneuver for laying on the crosspiece and relative linkages: constitution, operation, calibration and regulation. • Hand and electrically operated truck stop shoes: constitution, operation, calibration and adjustment. • Key-operated gate stops and relative C.E.F. : constitution, operation. • Electric turnout stops: constitution, operation, calibration and regulation. • Needs to tip control boxes: constitution, operation, calibration and adjustment. • Transmitt key constitution and functioning. • Manual maneuvering device: constitution and functioning. • Switch lights: constitution and functioning. • PL switch boxes and turnouts, switch stops, key transmitters, linkages. • Checks and checks of electrical circuits. • Characteristics of light signals, screen relay and SDO, operation, power supply, control. • Characteristics of the auxiliary light signals: operation, power supply, control • Constitution and operation of the P103 fluid-dynamic pedal and directional and non-directional Silc type • Sectioning and sorting boxes, connection diagrams. • Concepts of functionline: constitution and calibration of the Cdb at fixed current.	6,4
M3/S/UD3	Alimentazione degli impianti	8		• Power supply of signalling systems: wiring diagrams, voltages used, static control units, batteries, generator groups, block power supplies, redundant complexes, protections, calibrations. • Inverter: constitution, operation, cards and regulations. • Static switch: constitution, operation, cards and adjustments. • Emergency stabilizer: constitution, operation, cards and adjustments. • Battery charger: constitution, operation, cards and regulations. • Equipment for calibration and repair of regulation and control boards: how to use. • Alarms available on the terminal board and their connections available to the central devices. • Normal checks, inspections and maintenance of equipment and systems. • Abnormalities that may occur more frequently and measures to be taken to prevent them or to locate or eliminate them. • Signalling cables: types, use, channelling, laying, junctions, sectioning, tests and measurements.	0,8
M3/S/UD4	Strumenti e attrezzature	8		• Knowledge and use of measuring instruments, tools and means of work: testers, oscilloscope, ammeters, torque meters, induction meters. • Instrumentation for troubleshooting: cables, tools for making connections to the track, cable lugs and sockets. Practical exercise in the installation of a switch with electrical operation: tracking and drilling of the rail, casing and linkage installation, adjustments, cable connection. • Visits for knowledge of ACEL, BCA, SCMT plants. • Recognition of machine-to-man indications including faults and abnormalities. • Manipulation of human-machine interface devices including rescue actions	0,8
M4/UD AP	Addebtamenti pratici su schemi, componenti e apparecchiature	88		• Practical exercise of a spinning modification with reading of the scheme for modification. • Practical exercise of the regulation and verification of a continuity control unit. • Practical execution of maintenance of chronological event recorder, light signals. • Practical exercise of the regulation and verification of a continuity control unit. • Practical execution of maintenance of a fixed current track circuit, of fluid-electric pedals, directional and non-directional Silc. • Practical exercise of making connection of conductors to the rail with expansion bushes, continuity connections, connections with copper braid • Identification of the fault for each type of equipment • Taste repair or replacement • Calibration and adjustment of the equipment • Practical exercise of the regulation and verification of a continuity control unit.	8,8
TOTALE		336			33,6

quarto semestre	Percorso di trazione elettrica (TE)		Stage		CFU
	CODICE	SERIE	CONTESTO OPERATIVO		
					30 equivalent credits for the internship part calculated conventionally