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<tr><td>Anno Accademico:</td><td colspan="5">2023-24</td></tr>
<tr><td>Titolo insegnamento:</td><td colspan="5">Safety of new energy carriers in confined spaces</td></tr>
<tr><td>Dottorati interessati:</td><td colspan="5">Energetica; Ing. Aerospaziale; Ing. Civile ed ambientale, Ingegneria Elettrica; Ingegneria Meccanica; Ingegneria dell’Autoveicolo; Ing. Chimica; Ingegneria Gestionale e della Produzione; Fisica.</td></tr>
<tr><td>Titolare del corso:</td><td colspan="5">Francesco Demetrio Minuto</td></tr>
<tr><td>Dipartimento:</td><td colspan="5">Energia</td></tr>
<tr><td>Durata in ore:</td><td colspan="5">12</td></tr>
<tr><td>Lingua di insegnamento:</td><td colspan="5">Inglese</td></tr>
<tr><td rowspan="4">Elenco dei docenti proposti</td><td>Nominativo Docente</td><td>Interno/Esterno</td><td>Numero di ore</td><td>Ruolo/Posizione lavorativa (per esterni)</td><td>Ente di appartenenza</td></tr>
<tr><td>Francesco Demetrio Minuto</td><td>Interno</td><td>3</td><td></td><td></td></tr>
<tr><td>Davide Papurello</td><td>Interno</td><td>3</td><td></td><td></td></tr>
<tr><td>Daniel Fruhwirt</td><td>Esterno</td><td>6</td><td>Lecturer</td><td>TUG – Technical University of Graz</td></tr>
<tr><td>Presentazione del corso</td><td colspan="5">In today's framework of EU objectives, the decarbonisation of the transport sector is part of the seventeen Sustainable Development Goals of the UN 2030 Agenda. Considering Italy, 97% of vehicles in the road transport fleet in 2021 were equipped with thermal engines powered by fossil fuels. Therefore, to improve air quality and reduce CO2 emissions, the European Commission and the European Parliament have provided guidelines and deliberated packages of regulations, including the Fit for 55 package of measures, which provide for the reduction of CO2 emissions, also in the transport sector and according to defined timeframes. In the context of the energy transition in the transport sector, the available propulsion technologies are battery electric vehicles (BEVs), hydrogen fuel cell electric vehicles (FCEVs), hybrid vehicles (HEVs or PHEVs) and thermal engines powered by alternative fuels (hydrogen, natural gas (CNG), LNG, biofuels or synthetic fuels). Regarding light road transport (passenger cars and light commercial vehicles), the most promising technologies for decarbonisation appear to be battery electric vehicles (BEVs) and hydrogen-fuelled fuel cell electric vehicles (FCEVs). In this context, a lesson related to the main safety factors of hydrogen vehicles and refuelling stations are addressed. Especially considering the main components involved in the hydrogen carrier, i.e. the storage system and the delivery system to the FC. Hydrogen-powered vehicles, such as the Toyota Mirai and the Honda Clarity, use hydrogen stored under pressure with levels ranging from 350 bar to 700 bar. Four types of vessels are currently used, two are exploited for stationary applications (filling stations) and are made of steel; the other two are exploited in vehicles and are made of polymeric material. The problem of metal embrittlement and permeation in such vessels is crucial. Another aspect to consider is the operation under thermal stress conditions of the passive safety system installed in all tanks storing hydrogen in vehicles. In such a system, the presence of the TPRD valve is crucial and must be addressed. Methods and procedures to limit the above problems are addressed in the course.</td></tr>
<tr><td>Periodo di svolgimento</td><td colspan="5">18 – 20 Novembre 2024
18 Novembre: 9.00-13.00 Aula X (Minuto/ Papurello)</td></tr>
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	19 Novembre: 9.00-13.00 Aula X (Papurello/ Fruhwirt) *20 Novembre: 9.00-13.00 Aula X (Fruhwirt)*

Short Bio

Francesco Demetrio Minuto

Dr. Minuto is an Assistant Professor at Politecnico di Torino's Energy Department, specialized in hybrid storage systems for renewable energy balancing. His work, focusing on li-ion, flow battery technology, and hydrogen systems within energy communities, follows his tenure as a Post-doc researcher at Politecnico di Torino and Università della Calabria, where he also completed his PhD and Master's in Physics. Dr. Minuto has contributed extensively to scientific literature, with publications addressing renewable energy systems, hydrogen storage, and energy policy impacts. His research encompasses both theoretical and applied aspects, including collaborations with industrial partners on energy sustainability projects. Dr. Minuto is also actively involved in teaching, conference organization, and serves as a reviewer for reputable journals. His contributions have been recognized through awards and research grants, highlighting his significant impact on renewable energy research and education.

Davide Papurello

Dr. Davide Papurello received his M.Sc. in Energy and Nuclear Engineering and his Ph.D. in Energetics in 2014 (Politecnico di Torino). In 2011 he attended a specialization school for one year at Michelin spa on RAMS and maintenance analysis. He was a post-doc researcher following several national and international projects, collaborating also with other Institutions and Industrial companies, such as VTT, IEN, TUM, EPFL, FEM institute, SOLIDPOWER. He is presently a researcher at the Energy Center of Turin. He is the author or co-author of more than 60 articles in international journals with peer-review (2012- present). His research is in the fields of high-temperature fuel cells, road tunnel safety and compatibility with NEC (H2, EV) vehicles, Hydrogen safety issues, biogas production and purification methods, trace compounds monitoring, energy storage from thermal to electric storage using PCM materials and li-ion batteries, respectively. Dr. Papurello is also actively involved in teaching eng. courses at PoliTo and collaborate within Unite! with other research institutes.

Daniel Fruhwirt

Daniel Fruhwirt is a Postdoctoral Researcher at the Graz University of Technology, specializing in non-exhaust emissions from transport and the impact of alternative propulsion systems on transport safety. He holds a Doctorate in Technical Science and has significant experience in tunnel safety and ventilation. Daniel has been involved in teaching thermodynamics and conducting full-scale fire tests in tunnels.

His research interests focus on transportation safety, particularly concerning new energy carriers and their safety implications. He has participated in several notable projects, including those on railway emissions and tunnel safety (BRAFA project, etc.). He is also an active member of PIARC, the World Road Association, and has authored numerous scientific publications on related topics.