

**Course Syllabus for
Industry 4.0 PhD
(years 2022-23 /2023-24)**

Course title	Multidisciplinary Research Applications of Extrusion Based 3D Printing
Scientific Discipline Sector	ING-IND/16
Hours of instruction	20 hours
CFU	2 CFU
Semester	Second semester
Goal	The course shall address the various research applications of Fused Filament 3D Printing with non-conventional materials, also through a theoretical study of the process.
Syllabus	<ol style="list-style-type: none"> 1) 3D Printing processes and materials according to ISO/ASTM 52900 2) Fused Filament Fabrication analytical models 3) Latest research applications of filament extrusion and polymerization processes <ol style="list-style-type: none"> a. 3D printed microfluidics b. 3D printed sensors c. 3D printed actuators
Bibliography	<p>Gianluca Percoco, Luca Arleo, Gianni Stano, Francesco Bottiglione, Analytical model to predict the extrusion force as a function of the layer height, in extrusion based 3D printing, Additive Manufacturing, Volume 38, 2021,101791, ISSN 2214-8604,</p> <p>Gianni Stano, Gianluca Percoco, Additive manufacturing aimed to soft robots fabrication: A review, Extreme Mechanics Letters, Volume 42, 2021, 101079, ISSN 2352-4316,</p> <p>Slides and support material from lecturer.</p>
Examination method	Final examination in class