



# Training & Education

## Bridging the 3D Printing & AM Knowledge Gap

**UL's instructor-led and online courses help facilitate the safe and successful implementation of AM for many industry audiences, including engineers, designers, production technicians and business professionals.**

This comprehensive three-tier AM curriculum is built upon UL's independent global perspective and expertise related to all areas of safety science and manufacturing innovation. We are passionate about helping you understand and navigate the best possible 3D printing / AM solutions - relative to safety, quality and performance – for your unique business needs. UL training tiers are developed and delivered in collaboration with AM industry experts.

### Tier 1: Foundations of 3D Printing

Foundations of 3D Printing presents comprehensive introductory knowledge of the 3D printing industry. Covering terms and definitions, software and hardware, and safety and quality considerations, Foundations introduces you to print process challenges, benefits and limitations of the various technologies, and safety and quality considerations. Foundations is perfect for professionals interested in acquiring baseline knowledge of this innovative technology. The course is offered online via four e-learning modules and in full and half-day instructor-led sessions.



#### Foundations Instructor-led

- Full-day session includes technology demonstrations
- Conducted at numerous global locations
- Also available at customer locations

#### Foundations e-Learning

- Four e-learning modules
- On-demand and self-paced
- Approximately 2-1/2 hours in length

### Tier 2: AM Technical & Economics Training

#### Technical Training

UL's Tier 2 Technical training curriculum was developed collaboratively with industry leading adopters and AM technical subject matter experts. Intended for professional designers, engineers, technicians and business people, the AM Technical courses teach participants how to design manufacturable, functional and compliant parts, how to select materials and processes that meet business needs, and how to incorporate safety and quality into facility set-up and/or part production.

The Technical curriculum consists of four distinct courses. Duration of each course is two business days.

- Fundamentals of AM Designs
- Design Strategies for AM
- Managing Quality & Safety in AM
- Selecting AM Materials & Processes



## Economics Training

How can you benefit from the many advantages AM has to offer? Partnering with Berenschot, a leading Dutch consulting firm with a recognized AM practice, UL's AM Economics training targets senior engineers, engineering management, executives and investors who want to quantitatively analyze the economics of the AM supply chain as well as justify, optimize and monitor investments in their AM ecosystem.

Featuring a series of real-world technical and business case studies, this 2 1/2 day, instructor-led business school-style course focuses on the following five themes:

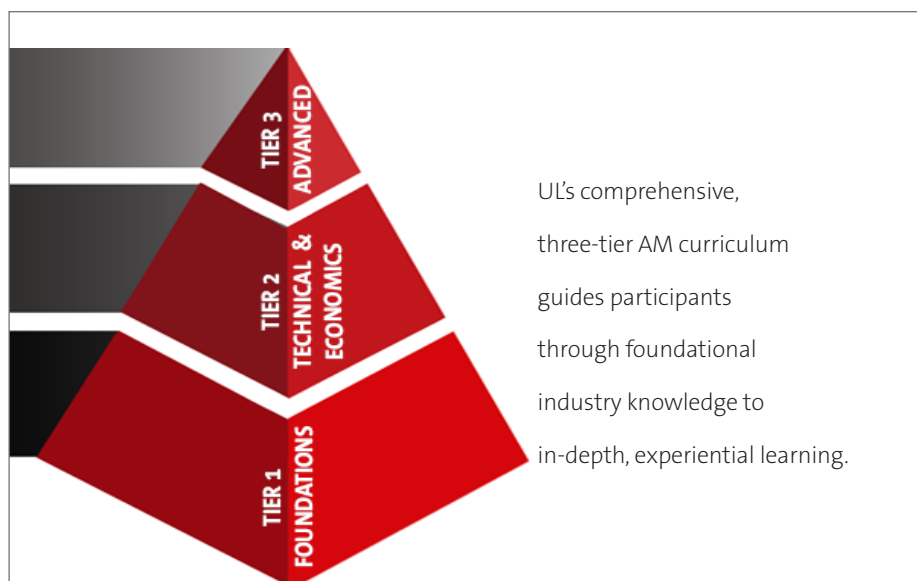
- Improvement in production efficiency (total cost reduction)
- Improvement in the efficiency and effectiveness of product development
- Enablement of new product designs
- Enablement of new supply chain structures
- Enablement of new business models

Examples of study contributors include LayerWise (Belgium), Croft Filters (UK), ASML (Netherlands), Additively (Switzerland) and Local Motors (United States).

## Tier 3: Advanced Training

Tier 3 builds competency to successfully fabricate metal parts, from AM design set up, to part build, post processing, and quality assurance.

The current Tier 3 course, Advanced Training on Metal Part Production, is exclusively offered at the UL AMCC in Louisville, Kentucky. Students learn and apply advanced metal additive manufacturing during this five-day hands-on course. Beginning with process and material fundamentals and progressing through design, build planning, process parameters, post-processing and quality evaluation, students design and manufacture parts as part of project teams.



## New for 2017:

## UL AM Training Powered by Ricoh

**RICOH**  
imagine. change.

Beginning in 2017, Ricoh USA, Inc., a technology and services company, and UL are collaborating to provide UL AM training to UL and Ricoh customers. The initial goal of the relationship is to promote the proper usage and advancement of AM technologies via UL AM training that leverages Ricoh's proven services and training expertise.

Tier 1 and Tier 2 training will initially be held at Ricoh's US-based dedicated training facility located in Lawrenceville, Georgia, then will scale to other geographies in the Americas.

## Get Started

Speak with the UL or Ricoh team for track specific scheduling and pricing details and about tailoring the Technical and Economics training to your business need or product category. Custom and private training options are available.

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