Additive manufacturing (AM) is enabling new design and performance opportunities for vacuum electronic devices by overcoming traditional manufacturing constraints. This mini-course will examine how AM can be leveraged to fabricate complex geometries, improve thermal management, and enable novel materials solutions for next-generation RF and vacuum electronic systems.

The course will introduce key process fundamentals for metal AM, with an emphasis on copper, and materials relevant to high-power and high-frequency devices. Topics will include process–structure–property relationships, powder feedstock considerations, in situ monitoring and control, and qualification challenges for high-reliability applications. Examples will highlight how advanced manufacturing approaches can be integrated into vacuum electronics design workflows, as well as current limitations and pathways to adoption in both research and production environments.