CHARACTERIZATION OF ACOUSTIC PROPERTIES OF 3D PRINTED MATERIALS. Xander D. Birchfield & Zachary E. Cullingsworth, Dept. of Physics, Engineering, & Astrophysics, Randolph-Macon College. The acoustical properties of natural and synthetic materials were compared to determine their acoustical similarities. The initial motivation for this study was to determine if musical instruments could be created faster and more economically with 3D printing technology. These synthetic materials included PETG, ABS, and nylon. These were printed using different parameters, specifically the infill percentage that corresponds with density. Spruce wood was used as the natural material in these experiments. After a careful analysis of the sound intensities of each material printed across a variety of infill parameters ranging from 20%, 40%, and 60%. It was concluded that nylon compared best acoustically to spruce wood. The results suggested that the optimal infill of a nylon instrument needed to be 30%. Therefore, an additional experiment was conducted at 30% infill, which resulted in the best agreement with spruce. This discovery allowed for the creation of a 3D printed ukulele. Currently, the first prototype ukulele is being assembled and its sound intensities will then be tested against a spruce ukulele. The infill parameters may be adjusted for future prototypes. Author contact: Xander Birchfield, [xanderbirchfield@go.rmc.edu](mailto:xanderbirchfield@go.rmc.edu).