Tantalum oxide, Ta_xO_{1-x}, films were prepared by magnetron sputtering Ta in oxygen onto heated silicon (100) substrates. The film thicknesses were measured by three different techniques in order to obtain thickness as well as an oxygen concentration. The first method was by x-ray reflectivity which yields a thickness value independent of the film composition. The second method was by measuring the attenuation of the Si Kα x-ray line from the underlying Si excited by a glancing incidence x-ray beam. Both the density and the mass absorption coefficient of the Ta_xO_{1-x} films decrease as x decreases so that the product mac*ρ varies from 63,000/cm for pure Ta to 27,000/cm for a composition corresponding to Ta_2O_5. This has the consequence that for Si Kα 50% attenuation occurs at 120 nm for Ta, and at 230 nm thickness for Ta_2O_5. Typical single channel peak counts for Si Kα are about 3,000 counts for 100 s collection times so that attenuation differences of a few percent are readily measurable. By setting the film thickness equal to that determined by x-ray reflectivity an atomic fraction x for the Ta_xO_{1-x} films can then be determined. The third method of thickness determination uses the simultaneous measurement of Ta fluorescence counts. For these less than 200 nm thick films there is very little matrix effects so that the Ta fluorescence counts are expected to, and are observed to, increase linearly with the film deposition time and consequently with the film thicknesses. Silicon substrate temperatures during film deposition could be varied from room temperature to 700 °C. Pure Ta films were made by magnetron sputtering Ta in argon. All x-ray measurements, including the reflectivity measurements, were made, with the addition of an x-ray fluorescence detector, using a Panalytical MRD system.