The hydrogenated amorphous silicon nitride thin films are deposited by DC magnetron sputtering in argon, molecular hydrogen and nitrogen plasma mixture. The films are deposited at 150 °C and at 130 W sputtering power with wide range of nitrogen mole fraction. The plasma is characterized by the target voltage measurement. The samples are characterized by the optical transmission measurements and the physicochemical structure is studied by the FTIR absorption spectroscopy. When the nitrogen mole fraction increases from 0.075 to 0.24 the target voltage decrease from 413 to 325 V and increases suddenly to 450 V when nitrogen mole fraction increases to 0.69. The decrease of target voltage may be due to the transition from metallic to reactive sputtering process and its increase can be explained by the implantation of reactive ions in the target. Sputtering rate and refractive index decrease respectively from 8.33 to 1.73 Å/sec and from 2.52 to 1.68 with nitrogen mole fraction. The value of refractive index at critical nitrogen mole fraction is about 1.8. When the nitrogen mole fraction increases the frequency related to Si-H band, on FTIR spectrum, shift from 2097 cm^{-1} to reach 2209 cm^{-1} at the critical nitrogen mole fraction. Thereafter it varies sharply to 2190 cm^{-1} and remains constant. A sudden change is observed on the sputtering rate, on the intensity of the band attributed to the stretching vibration of N-H and Si-H bonds. From these results we believe that the stoichiometric composition is reached at the critical nitrogen mole fraction and beyond this the deposited films are rich of nitrogen and hydrogen. This is consistent with the explanation given of the variation of the target voltage.