We use the descent spectral sequence to compute the complex oriented cohomology of the classifying space for the exceptional group $G_2$. This gives it as a quotient of the image of $B Spin_7$ in $BSO_7$. If time permits, I will explain how this enables one to compute the Chow groups of $BG_2$, even though the descent spectral sequence fails for higher Chow groups (as there are no Nisnevich sections for the fibrations we use). (Received September 22, 2011)