The bachelor thesis is focused on studying yeast cells and their response to various external conditions. Main focus was on the study of intracellular pH and membrane potential change under the condition of varying extracellular concentration of K^+ ions. In particular we studied to what extent are the yeast cells able to compensate these changes. The ability of yeasts to resist the changes of external pH of the cell medium was studied in an experiment complementary to the measurements of intracellular pH. To measure the intracellular pH a genetically encoded fluorescent probe ratiometric pHluorin was used and to measure the changes of membrane potential a fluorescent probe diS-C_3(3) was used. Also we successfully applied a method of synchronously scanned fluorescence to supress the cell autofluorescence.