# Exam Stellar Structure and Evolution
## 3 September 2019, 14:00–17:00

Name:                                     Student number:

The written part of the exam counts for 12 points. The MESA lab work + its oral exam counts for 8 points. You can only pass this course if you pass both parts separately.

1. Consider a star that got born in the same stellar cluster than the Sun, but with a mass of $6\,M_\odot$.

   - Compute the luminosity that this star had at its onset of core hydrogen burning.
   - Compute the average density of this star at the ZAMS. Is this higher or lower than the average density of the Sun at the ZAMS? By how much?
   - Is this star still alive? Explain why (not). What kind of object is it now?
   - This star will (have) enrich(ed) the Milky Way with chemical elements. What is the most dominant chemical element that it will deliver to its surroundings? Explain.

   (maximally 2 pages, 6 points)

2. Give an explanation/definition, using maximally 1/3 of a page for each of the following physical phenomena. Indicate if the phenomenon will occur in the life of three stars that just got born with solar metallicity and with a mass of $0.5, 5.0, 50\,M_\odot$, respectively. Explain why (not):

   - helium flash
   - triple-alpha reaction
   - third dredge-up
   - P Cygni profile
   - rapid neutron capture
   - Eddington limit

   (maximally 2 pages, 6 points)