NASSP Master's Stellar Atrophysics Course Programme 2026

Course Title:	**Stellar Astrophysics (StAst)**
Course Lecturer:	**Dr Chris Engelbrecht. [email: engelbrecht.chris@gmail.com]**
Course credits:	1
Lecturer contact hours:	24 formal lectures + 3. tutorial hours [further tutorial hours may be added if the need arises and venues are available]

1) Course overview:

Stars form a major component of the fabric of galaxies and need to be understood very well to enable reliable research on the structure and evolution of galaxies to be performed. Our understanding of stellar structure & evolution has accelerated very quickly over the past few decades, mainly as a result of unprecedented observational precision (at the 1 ppm level) and huge computing power becoming available. This course provides an introduction to the most important aspects of the current state of understanding of stellar structure & evolution, with the aim of equipping students to navigate current research in the field as effectively as possible. The academic level of the course is rigorous, as befits a course at Masters level.

2) Course breakdown/syllabus:

Part A: Advanced topics in Stellar Structure

A1. Advanced aspects of convective energy tranfer in stars

A2. The effects of stellar rotation on overall structure and internal dynamics

A3. Advanced aspects of the physics and observation of stellar pulsation

A4. Selected physics of close binary systems

Part B: Advanced topics in Stellar Evolution

B1. Overview of cutting-edge research in star formation, main-sequence evolution, and post-main-sequence evolution

B2. Stellar modelling resources

B3. Databases, and upcoming missions and programmes addressing stellar structure & evolution

3) Mode of delivery:

An online delivery mode will again be followed in 2026. Lectures will be delivered in a combination of powerpoint/whiteboard format in the scheduled lecture timeslots. The lectures will be presented via the Zoom portal. Students assemble at a designated venue in the Astronomy Department, where the videolink will be running.

Please consult the NASSP Timetable for class times.

4) Resources:

Powerpoint notes will be emailed to the class immediately after each double lecture. Due to the online mode of delivery, the notes have been compiled in a 'conversational' style to ease students' engagement with the material. No textbook will be used; I have compiled the notes from my own background of work in stellar physics, based on a large variety of sources. Reading assignments may further be given as part of the material assessed for exam purposes.

5) Additional skills to be developed during the course:

Many aspects of fundamental physics will be reinforced (or encountered for the first time, for some students) as we work through the course topics.

6) Assessment

There will be scheduled homework assignments, a 'Prelim' test, and a Final exam. Weights and mark allocations are still to be finalised and will be communicated to you at a later stage.