

# C1: Advanced Stellar Astrophysics, HT 2019

## **Contact:**

Prof. Philipp Podsiadlowski

DWB, Room 702

Tel: (2)73343

email: [podsi@astro.ox.ac.uk](mailto:podsi@astro.ox.ac.uk)

course webpage: [http://www-astro.physics.ox.ac.uk/~podsi/lec\\_c1\\_mt04.html](http://www-astro.physics.ox.ac.uk/~podsi/lec_c1_mt04.html)

## **Lecture Location and Dates:**

Lectures take place on Wednesdays, 12 – 1 pm, and Thursdays, 10 – 11 am, weeks 1 – 5/6.

All lectures will take place in the **Dennis Sciama Lecture Theatre**.

## **Topics:**

*(The timing of the topics is only approximate and not all topics may be covered.)*

Lectures 1 / 2: Crash course on stellar structure and evolution

Lectures 2 / 3: The evolution of massive stars, supernovae: explosion mechanisms, classification, supernova light curves, supernova kicks, Type Ia supernovae and their use as cosmological distance candles, SN 1987A, superluminous supernovae

Lectures 4 / 5: The formation of compact objects; neutron stars and black holes, radio pulsars, millisecond pulsars

Lecture 6: Hypernovae and gamma-ray bursts; history and observations; the fireball model, the progenitors of gamma-ray bursts

Lecture 7 / 8: Compact Binaries: the formation of compact binaries, magnetic and non-magnetic accretion processes, the Eddington limit, Roche-lobe overflow and wind accretion, accretion onto black holes, ultraluminous X-ray sources

Lecture 9: The discovery of gravitational waves with Advanced LIGO: the detectors and the first discoveries, astrophysical sources, the Pulsar Timing Array

Lecture 10: Star formation: observations; molecular clouds and gravitational collapse (Jeans instability), pre-main sequence evolution, star formation in clusters, the first stars and planet formation