Role of the Post-Graduate student

Carlton Baugh

Astronomy Postgraduate Course Director

Aims:

- overview of the astronomy post-graduate course
- basic guidance on what you should expect in your PhD
- what is expected of you

Contacts

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Dimitri Gadotti, Ryan Cooke – Astro PG recruitment

Astronomy at Durham

Durham University

Institute for Computational Cosmology
Centre for Extragalactic Astronomy
Centre for Advanced Instrumentation

- **34 permanent members of staff and long-term fellows**
- **around 100 postdocs, students, and support staff.**

PG course: structure, lectures, and course work

- **Astro Lectures:**
  - typically 1 hour each, on average 1 per day
  - 9am in OCW017 (sometimes also 10am lecture)
  - Some afternoon classes/workshops
  - will soon get email invitation to course calendar

  - Calendar gives lecture course name, lecturer
- **Aim:** basic research and specific skills needed for PhD and give wider background - become an independent researcher

More about lecture courses & assessment

- **Research skills: general computing, statistics, programming, high-performance computing, instrumentation, data reduction, scientific paper writing, evaluating scientific papers**

- **Science lecture courses cover broad range of astrophysics from stars to cosmology**
  - Coursework is set for every lecture series
  - should typically take ~3 hours of your time
  - Aim is to give you grounding in key principals in astrophysics

  Fine to discuss homework – virtual homework club?

  Hand in your own solutions

Computing

- Programming: **Python (self-study)**
- Basic computing & local system
- **Introduction to COSMA**
- Workshops: choose **Data Reduction** or **High Performance Computing MSc lectures**
- Scientific computing: python & compiled language: lectures and exercises

Python self study course

- Uses course designed by ARCHER for Durham.
- http://www.archer.ac.uk/training/course-material/2018/09/scipy-durham/index.php
- Self-study: work through L01-L05

Astrophysics courses

Michaelmas term:

- Stellar populations
- Stellar structure
- Galaxy clusters
- Black holes
- High-z universe
- Gravitational lensing
- Milky Way
- Active Galactic Nuclei
- Cosmology
- Astronomical instrumentation
- Large-scale structure

Astrophysics courses

Epiphany term:

- Stellar dynamics
- Secular evolution in galaxies
- Galaxy formation
- N-body simulation workshop
- Interstellar medium/intergalactic medium (+workshop)
  - Data reduction workshop
- Radio astronomy

PG course: optional components

- HPC,
  Data reduction workshop,
  radio interferometry workshop
  N-body simulation workshop
- Tell me which ones you pick
- e.g. ICC – HPC, N-body simulations
- e.g. CEA – data reduction workshop, radio interferometry

MISCADA MSc lectures

- Term 1: Module PHYS51915

- Data Analysis – Anna McLeod
- Scientific computing – Tom Theuns

- Machine learning
- High Performance Computing – for theorists/simulators

MISCADA timetable

Module number: PHYS52015 –

Numerical analysis – Tom Theuns
HPC – Chris Marcotte

See timetable page:

https://timetable.dur.ac.uk/module.htm

MISCADA timetable

Module number: PHYS51915

Core 1a

Weeks 1-4: **14.00-16.00 TLC025 Tuesday Statistics Anna McLeod**
09.00-11.00 TLC025 Friday Statistics Anna McLeod

Week 5 – **14.00-17.00 TLC025**

Weeks 6-10 **14.00-16.00 TLC025 Tuesday Machine Learning Daniel Maitre**
16.00-18.00 TLC025 Friday Machine Learning Daniel Maitre

Course Assessment: homeworks, critique, talk, progression report and viva

- **Essay/critique**
  - ~2500 word critique of opposing studies - designed to develop your science evaluation skills and also your scientific writing skills
    - Will have lecture on scientific writing skills before the essay is set
  - ~12 min presentation of the critique with 3 min of questions

- **Friday lunchtime talk** (~20 mins) on your research towards the end of the first year

- **Progression report and viva (towards end of year)**
  - ~5000 word report on your research to date - background material, techniques, and results
  - ~30-45 min oral defence of your report with 2 examiners

- **Progression into second year is dependent on**

  (1) passing the post-graduate course and completing the course work

  (2) successfully completing your progression report and viva

Astro-PG Course Assessment: critique, talk, progression report and viva

Critique and talk:

- 2nd term
- Start of March – deadline for submitting draft to supervisor
- mid March – deadline for final draft
- end of March – talks

Progression report:

- 5000 word report
- 15th June – deadline for submitting draft to supervisor
- Supervisor arranges examiners, date for viva and date for final submission – before 31st July
- Process to be completed in advance of university progression deadline 31st August

PG research: some of the key skills

- **Problem solving,** which you will develop. Do not feel intimidated about asking others (students/PDRAs/staff) for help!
  - Achieve a balance between being independent and seeking advice when necessary
  - Achieve a good relationship with your supervisor: different supervisor/student combinations will have different approaches - work out what works for you both!
- **Presenting your scientific results**
  - Improve your presentation skills: give presentations to the group then progress to larger national meetings and then international conferences
  - Improve your writing skills by writing research papers and proposals
  - Discuss your results with others (students/PDRAs/staff) - explaining your work helps you better understand what you have done and why!
- **Understanding how your work fits into the bigger picture**. Follow the background scientific literature and recognise the strengths and weaknesses of your research (and the research of others)
  - Follow new research in your area by following, e.g., arXiv.org pre-print archive regularly (e.g., each day or week) and NASA ADS

Dividing your time between research and PG course

- Post-graduate course runs for two terms
- 25-50% of your time will be spent attending lectures and completing course work
  - Manage your time so you can make progress on your research

- Third term: complete your research report and pass your viva (by end of June) - often this is the first draft of your research paper
- Postgraduate quarterly reports on physics database; annual review reports on duo

Your supervisors know that you attend the PG course and undertake the course work.

Building your research portfolio

- **Your success in research so often depends on your research portfolio**
  - Your scientific papers
  - Your reputation for giving good presentations
  - Your visibility within your research community
  - Talking to researchers from outside Durham (e.g. seminar speakers/visitors)

- **Directing your PhD research**
  - At first your supervisor will guide your research
  - Towards the end of PhD you should start to take control and design your own research experiments/projects

Other training opportunities

- All students complete a Training Needs Analysis with supervisor
- Identify training needs beyond those met by PG course
- Centre for Academic, Researcher and Organisation Development (CAROD)
- HPC/Fortran – Hamilton/CIS
- https://www.dur.ac.uk/cis/training/courses

Weekly events

Expected to attend:

- Wednesday seminars (/CfAI seminars)

  2 pm seminar

  - Student journal club: Weds 11am
  - Opportunity to go to lunch with speaker
- Friday lunchtime talks (internal speakers)
- 1st year astro-ph journal club – Mondays 2nd & 3rd terms
- Monday 1pm: a series of events organised in succession once per month:
  All-astro lunch, Theory lunch

Other events:

- arXiv journal club (every day 10.45 OCW Level 1)
- Wednesdays 11 – student journal club
- For full list see:
  http://icc.dur.ac.uk/index.php?content=Events/InterestGroups