PhD Graduate Certificate Elective Units – CAS Recommendations

This version prepared by Chris Blake, 23 August 2019

All PhD students commencing their study in 2018 onwards have been enrolled by Swinburne in the "Graduate Certificate of Research and Innovation Management". This course comprises two core units delivered by Swinburne Graduate Studies (which must be completed prior to Confirmation of Candidature), and two elective units (which may be completed at any point during the PhD).

The elective units may be selected from a range of options, with the aim of providing PhD students with the most relevant skills and professional training to help with their studies, as well as supporting future career development in either academia or industry. In this document we summarize our recommendations for CAS PhD students regarding these electives.

CAS PhD students should select 2 out of the following 3 elective units:

- **MFP60004: Research Engagement (STEM)**
- **MFP60005: Research Training (STEM)**
- **COM80001: Advanced Research Communication Skills (STEM)**

We see MFP60004 and MFP60005 as the typical choice of electives for CAS students, with COM80001 providing an alternative option for students who wish to focus on scientific writing and communication.

CAS is creating its own activity programmes for MFP60004 and MFP60005. These are based on a combination of our usual centre activities in which students participate, together with specially-developed units that we think our PhD students will find useful and relevant.

The Faculty's unit outlines for MFP60004 and MFP60005 describe that students complete a variety of different activities toward these units. **We have mapped our CAS programme to this system as described below**. All the activities are pass/fail and there are no exams.

There is an intention that each unit at Swinburne may be associated with up to 150 hours of work, but in this case the majority of this work occurs as part of the day-to-day development of the skills needed to complete a PhD. More realistically, each unit may involve **30-60 hours** of direct activity over the course of the PhD, minimizing any impact on research time, where possible.

Please note that all CAS PhD students and staff are welcome to participate in any activity if they are interested to do so, regardless of the Grad Cert requirements. All new elective activities developed by CAS will be available **from the start of 2020**. However, relevant activities that students have already completed are eligible for inclusion.

Options for CAS students in MFP60004 – Research Engagement

We recommend that students complete the following activities *[the italics indicate how these will be mapped to the Faculty's unit outline]:*

- **CAS colloquiua**. To fulfil this module's requirements, students provide a written reflection on 4 CAS colloquia during their candidature. Each written reflection will involve a maximum of 2 hours of work, including attending the 1-hr presentation and writing up a brief reflection on the activity (200 words maximum). Activity organizer: Emma Ryan-Weber. *[Classified as 40 points in Activity 9 in the MFP60004 unit outline]*

- **CAS journal club.** Students present 4 papers during their candidature at the weekly CAS journal club to fulfil this module's requirements. Presenting a paper will involve a maximum of 4.5 hours of work, split between reading, preparing the presentation, giving the presentation (10min talk + 5min question time), a short feedback session and writing up a brief reflection on the activity (200 words maximum). Activity organizer: Michael Murphy. *[Classified as 40 points in Activity 8 in the MFP60004 unit outline]*

Students can then choose between the following typical PhD activities, to add up to 70 points. For example, 2 oral presentations about your research at a conference or workshop will satisfy the requirements.

- Prepare and present a **public outreach talk** or engagement event based on your research. *[Classified as 20 points in Activity 4 in the MFP60004 unit outline]*

- Give an **oral presentation** about your research at a conference or workshop. *[Classified as 40 points in Activity 5 in the MFP60004 unit outline]*

- Give a **poster presentation** about your research at a conference or workshop. *[Classified as 20 points in Activity 6 in the MFP60004 unit outline]*

- Serve as a **student representative** on a scientific committee such as a telescope allocation committee or equivalent. *[Classified as 10 points per meeting in Activity 1 in the MFP60004 unit outline]*

- Serve on a **conference scientific organizing committee**. *[Classified as 30 points in Activity 2 in the MFP60004 unit outline]*

Please note that PhD progress review talks cannot be counted as the oral presentation activity, since the Grad Cert cannot include material directly related to the PhD degree. Astrotours are also excluded.

Please contact Chris Blake (cblake@swin.edu.au) if you wish to suggest other research-focussed engagement activities to add to the above list. We wish to be flexible in supporting existing student activities wherever possible.

Options for CAS students in MFP60005 – Research Training

CAS PhD students should select 2 out of the following 4 options.

- Study the module **Statistics for Physical Scientists**. This module is a primer on topics including basic descriptive statistics, searching for correlations, hypothesis testing, model-fitting and Bayesian inference. The course combines online material with several face-to-face workshops, with an emphasis on active learning through python notebooks. Around 20 hours' work will be required. The module will run once a year, during the first half of the year. Activity organizer: Chris Blake.

- Complete a series of **data science and scientific computing modules**. This module will use the ADACS online learning management system (LMS), along with 1-2 half-day face-to-face hands-on workshops, to cover essential computing topics relevant for an astronomy PhD. Students will be able to mix-and-match the LMS courses, which focus on skill areas such as programming, HPC, scientific visualisation, and machine learning. We plan to run this module once a year, during the second half of the year. Activity organizer: Darren Croton.

- Study at least one of the two **CAS Physics Honours modules** – currently these are Galaxies/Cosmology, and General Relativity. PhD students will be expected to complete the assessments for the module, but not the end-of-semester exam. These units run between March and May each year. Activity organizer: Karl Glazebrook and Ivo Labbe for Galaxies/Cosmology, Chris Blake for General Relativity.

- Study the **short course in the space industry**. This course introduces students to the space industry landscape in Australia and internationally, and the treaties governing it, including an overview of the different space companies/agencies and their roles. Students will be guided in developing their own space project, culminating in a presentation to a space industry panel. Other than this presentation the course is online, with around 20 hours' work required. There is currently a small cost to participate in the course. Activity organizer: Virginia Kilborn. Weblink: https://www.swinburne.edu.au/study/course/space-application/.

Notes on the relation to the MFP60005 unit outline: Each of these options is worth 80 points toward MFP60005, such that 2 options will surpass the requirement of 150 points. The options are split into activities of varying length and will be split between Activity Types 2, 3, 4 and 5 in the MFP60005 unit outline. Please note that CAS PhD students should ***not*** *select Activities 6, 7, 8 and 9 in the MFP60005 unit outline. These activities relate to writing papers. Since our papers typically appear in the final PhD thesis, this would then involve submitting the same work for different degrees.*