Australian National University

Australian Higher Education Graduation Statement

The Australian Higher Education Graduation Statement is provided by Australian higher education institutions to graduating students on completion of the requirements for a particular higher education award. It provides a description of the nature, level, context and status of studies that were pursued by the individual named. Its purpose is to assist in both national and international recognition of Australian qualifications and to promote international mobility and professional recognition of graduates.

1. the graduate

Name Rajika Lakmali Kuruwita

Student number 5749282

2. the award

Name of award

Doctor of Philosophy

Detail

"The Doctor of Philosophy, PhD, is an AQF level 10 Doctoral Degree (Research) which normally takes between three and four years of full-time study or part-time equivalent and is conducted in English. This award is made principally on the basis of a research thesis comprising original written work, normally of up to 100,000 words, that is independently assessed by no fewer than two examiners where at least one examiner is external to the University. In some disciplines an alternative to a written thesis may be submitted and assessed. Admission to a Doctor of Philosophy program is normally granted to applicants holding a Master by research degree or a Bachelor degree with First Class Honours or Second Class Honours Division A. Admission can be granted to applicants who demonstrate a background equivalent to these qualifications."

Features

The Doctor of Philosophy program at ANU consists primarily of research which is supervised by a panel of researchers. The program contains a number of key research milestones including a research proposal, annual reports, an oral presentation and research integrity training in addition to the main thesis. Significant fieldwork and some coursework is a common component of a Doctor of Philosophy.

Doctor of Philosophy students may be given the opportunity to attend or present at relevant national/international conferences or to publish articles based on their research. They may also be offered teaching opportunities such as lecturing and/or tutoring.

3. awarding institution

The Australian National University is a research intensive education institute established by an Act of the Australian Parliament on 1 August 1946.

For more information about The Australian National University visit www.anu.edu.au

certification

date 18 July 2019

Ariel Edge
Registrar, Student Administration

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4. graduate's academic achievements

Doctor of Philosophy awarded 18 July 2019

Course Code	Course Title	Units	Mark	Grade
2015	**FIRST SEMESTER**			
ASTR 9550F	Doctor of Philosophy - Research Course, Research School of Astronomy & Astrophysics	20	RC	RC
2015	**SECOND SEMESTER**			
ASTR 9550F	Doctor of Philosophy - Research Course, Research School of Astronomy & Astrophysics	24	RC	RC
2016	**FIRST SEMESTER**			
ASTR 9550F	Doctor of Philosophy - Research Course, Research School of Astronomy & Astrophysics	24	RC	RC
2016	**SECOND SEMESTER**			
ASTR 9550F	Doctor of Philosophy - Research Course, Research School of Astronomy & Astrophysics	24	RC	RC
2017	**FIRST SEMESTER**			
ASTR 9550F	Doctor of Philosophy - Research Course, Research School of Astronomy & Astrophysics	24	RC	RC
2017	**SECOND SEMESTER**			
ASTR 9550F	Doctor of Philosophy - Research Course, Research School of Astronomy & Astrophysics	24	RC	RC
2018	**FIRST SEMESTER**			
ASTR 9550F	Doctor of Philosophy - Research Course, Research School of Astronomy & Astrophysics	24	RC	RC
2018	**SECOND SEMESTER**			
ASTR 9550F	Doctor of Philosophy - Research Course, Research School of Astronomy & Astrophysics	24	RC	RC
2019	**FIRST SEMESTER**			
ASTR 9550F	Doctor of Philosophy - Research Course, Research School of Astronomy & Astrophysics	4	CRS	CRS

Thesis

The formation, evolution, and survivability of discs around young binary stars

In the age of the Kepler space telescope and other exoplanet finding missions, a variety of exotic planets have been discovered. Some of these planets have been found to be in binary star systems --- systems which have historically been overlooked in planet formation models. This is due to the single star scenario being simpler to model than binaries, as well our anthropocentric bias towards single stars like our Sun. However, planet formation around binary stars in an important topic because a large fraction (50%) of stars form in binary systems.

In this thesis I investigated the physics that influences the creation, stability, and survivability of discs around binary stars with the broad understanding that the longer the lifetime of a disc (around a single or binary star) the higher the likelihood of producing planets.

The theoretical work of this thesis was conducted using the ideal magnetohydrodynamical numerical simulation program FLASH. I simulated the collapse of molecular cores until the formation of protostars and followed the early evolution of these systems. For the first theoretical project I investigated the influence that binarity had on the global evolution of a young stellar system. This included studying mechanisms such as accretion, jets and outflows, and dynamical interactions. I found that binary stars produce weaker outflows when considering the transport of mass, linear momentum, and angular momentum. For the second theoretical project I investigated the formation of discs in binary stars with the inclusion of turbulence in the initial conditions. I found that the turbulence helped to build large circumbinary discs which restructured the magnetic fields for efficient outflow launching, but too much turbulence may also disrupt this organisation of magnetic fields. Given the environment where binary stars form (turbulent molecular cores), it appears that the formation of circumbinary discs should be common place, however circumstellar discs could also be destroyed quickly in these same environments.

My observational work aimed to determine the typical survivability of discs around binary star systems. This work was carried out by using the Wide Field Spectrograph (WiFeS) on the Australian National University 2.3m Telescope to search for radial velocity variation in disc-bearing members of the 11Myr and 17Myr old star-forming regions Upper Scorpius and Upper Centaurus-Lupus. I found that the binary fraction of disc-bearing stars in these regions do not differ significantly from the field star binary fraction. I hypothesised that this is due to two competing factors: circumstellar discs are disrupted by companions and are dispersed quickly, but circumbinary discs are more common than equivalently sized discs around single stars. These results suggest that the typical lifetimes of discs in single and binary stars are comparable.

Overall, I found that in some scenarios binary stars may produce hostile environments for planet formation via the destruction of circumstellar discs, but the formation of large circumbinary discs is likely to be a common occurrence. This suggests that planet formation is as likely around binary stars as single stars. Therefore, planet formation around binary stars needs to be considered to understand overall planet formation.

Special achievements, recognition and prizes

Scholarships
Australian Postgraduate Award (APA)
ANU Supplementary Scholarship
Australian Government Research Training Program Fee-Offset Scholarship
Australian Government Research Training Program Domestic Scholarship
Joan Duffield Research Award
Postgraduate Research Scholarship

5. description of the australian higher education system

Introduction

The Australian higher education system consists of self-governing public and private universities and higher education institutions that award higher education qualifications.

The Australian Qualifications Framework

The Australian Qualifications Framework (AQF) is a single national, comprehensive system of qualifications offered by higher education institutions (including universities), vocational education and training institutions and secondary schools.

The AQF has 10 levels, each with defined criteria based on a taxonomy of learning outcomes. Higher education qualifications are placed between level 5 (the Diploma) and level 10 (the Doctoral Degree). The Bachelor Degree is at level 7. Each AQF qualification has a set of descriptors which define the type and complexity of knowledge, skills and application of the knowledge and skills that a graduate who has been awarded that qualification has attained, and the typical volume of learning associated with that qualification type. The full set of levels criteria and qualification type descriptors can be found by visiting www.aqf.edu.au.

The main AQF qualifications awarded by higher education institutions are Bachelor Degrees, Masters Degrees and Doctoral Degrees. There are also three qualifications at the sub-degree level: the Diploma, the Advanced Diploma and the Associate Degree. At the graduate level but below the Masters Degree are the Graduate Certificate and Graduate Diploma.

Level	Summary	Qualification Type
Level 1	Graduates at this level will have knowledge and skills for initial work, community involvement and/or further learning	Certificate I
Level 2	Graduates at this level will have knowledge and skills for work in a defined context and/or further learning	Certificate II
Level 3	Graduates at this level will have theoretical and practical knowledge and skills for work and/or further learning	Certificate III
Level 4	Graduates at this level will have theoretical and practical knowledge and skills for specialised and/or skilled work and/or further learning	Certificate IV
Level 5	Graduates at this level will have specialised knowledge and skills for skilled and/or paraprofessional work and/or further learning	Diploma
Level 6	Graduates at this level will have broad knowledge and skills for paraprofessional and/or highly skilled work and/or further learning	Advanced Diploma Associate Degree
Level 7	Graduates at this level will have broad and coherent knowledge and skills for professional work and/or further learning	Bachelor Degree
Level 8	Graduates at this level will have advanced knowledge and skills for professional highly skilled work and/or further learning	Bachelor Honours Degree Graduate Certificate Graduate Diploma
Level 9	Graduates at this level will have specialised knowledge and skills for research, and/or professional practice and/or further learning	Masters Degree
Level 10	Graduates at this level will have systematic and critical understanding of a complex field of learning and specialised research skills for the advancement of learning and/or for professional practice	Doctoral Degree

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Admission

Requirements for admission to particular awards are set by higher education institutions and provide a range of routes for entry and only admit those students considered to have potential to complete an award successfully. Admission of school leavers to undergraduate awards is typically on the basis of the level of achievement in Year 12 secondary education, although some institutions and awards also use interviews, portfolios or demonstrated interest or aptitude. Most institutions also provide alternative entry provisions via bridging or foundation programs for mature age students or other special provisions, such as recognition of prior learning from previous study. Admission to post-graduate awards is generally based on the level of achievement in previous higher education studies and in most cases, admission to PhD awards is based on high achievement in a research Masters Degree or in a Bachelor Degree with first class honours or second class honours division A.

Quality

Quality assurance and stringent approval requirements for higher education institutions ensure that Australia has an international reputation for high quality education.

The Tertiary Education Quality and Standards Agency (TEQSA) was established on 30 July 2011 as a new national regulator and quality assurance agency for higher education. TEQSA is an independent body with the powers to regulate university and non-university higher education providers and monitor quality against standards.

From 29 January 2012 TEQSA assumed responsibility for registering and re-registering providers and accrediting and re-accrediting awards for higher education providers that do not have authority to accredit their own awards. At the time of registration, re-registration, accreditation and/or re-accreditation, TEQSA evaluates the performance of a higher education provider against the Higher Education Standards Framework. The Standards Framework comprises: Provider Registration, Category and Course Accreditation Standards and Qualification Standards (based on the AQF). The Higher Education Standards Panel, which is independent from TEQSA, is responsible for developing and monitoring the Standards Framework.

TEQSA also undertakes quality assessments of individual providers or reviews issues within the sector across a cohort (thematic reviews). These reviews help to identify sectoral good practice, guide sectoral quality enhancement and inform policy and research.

TEQSA's primary aim is to ensure that students receive a high quality education at any of Australia's higher education institutions.

All higher education institutions receiving Australian Government financial support must meet quality and accountability requirements that are set out in the Higher Education Support Act 2003. The Australian Government also uses a range of tools to measure and monitor the quality of outcomes, while the interests of international students are protected by the Education Services for Overseas Students Act 2000 and the Commonwealth Register of Institutions and Courses for Overseas Students (CRICOS), providing tuition assurance and ensuring that institutions listed on CRICOS meet defined minimum standards.

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Explanation of grades and codes

Key to grades and codes					
HD	High Distinction	80 - 100	H1	First Class Honours	80 - 100
D	Distinction	70 - 79	H2A	Second Class Honours Division A	70 - 79
CR	Credit	60 - 69	H2B	Second Class Honours Division B	60 - 69
P	Pass	50 - 59	H3	Third Class Honours	50 - 59
CRS	Course Requirements Satisfied	ungraded pass	IP	In progress (continuing course)	
PS	Pass at supplementary exam	50	KU	Continuing course	
HLP	Higher Level Performance	higher ungraded pass	EE	Enrolled elsewhere	
N	Fail	0 - 49	EXE	Exemption external (no unit value)	
NCN	Not complete/Fail	not graded	EXI	Exemption internal (no unit value)	
WD	Withdrawn without failure	not graded	RC	Research continuing	
WN	Withdrawn with failure	not graded	STE	Status external (external credit)*	
WL	Withdrawn late without failure	not graded	STI	Status internal (internal credit)*	

This explanation is current at 1 July 2011. Subsequent amendments and further details of assessment notations are available at **drss.anu.edu.au**

*Results for internal status credited to the specified award are not recorded on this Graduation Statement. Please see the graduate's Transcript of Academic Record for these results. Results for any external status credited cannot be provided by ANU.

Unit values and equivalencies

The majority of courses offered at ANU are valued at 6 units. The normal maximum load in a semester or half-year is 24 units (normally 4 courses). Undertaking 18-24 units per semester is considered a full-time study load.

ANU considers 30 European Credit Transfer System (ECTS) credits as equivalent to 24 ANU units.

Course information

Details of the syllabus for individual courses listed on this Australian Higher Education Graduation Statement may be found in the relevant University Handbook for the year indicated. Alternatively, course information may be obtained from the relevant academic area.

Semesters and sessions

Coursework programs		Research programs	
First Semester	February - June	First Semester	1 January - 30 June
Second Semester	July - November	Second Semester	1 July - 31 December
Summer Session	January - March	Quarter 1	January - March
Autumn Session	April - June	Quarter 2	April - June
Winter Session	July - September	Quarter 3	July - September
Spring Session	October - December	Quarter 4	October - December

Transcript of Academic Record

The information contained within this Australian Higher Education Graduation Statement pertains to the specified award only. For a complete history of academic results achieved at ANU, or results for courses granted as internal status, please see the graduate's Transcript of Academic Record.

Glossary of terms

Terminology	Explanation
Award	A certificate, diploma, degree, associate degree, graduate certificate or graduate diploma, conferred by the University to a person upon the completion of an academic program leading to an award, for example a Bachelor of Arts. The award is represented by a testamur and is presented to a graduate upon graduating.
Course	A discrete entity of study in a subject, normally of one semester or session in duration, identified by an alpha-numeric code. For example, 'ENGN3224 Energy Systems Engineering' is one course. Three or four courses per semester or half-year normally constitutes full-time enrolment.
Grade	A classification of achievement based on the final mark. For example a grade of High Distinction (HD) indicates a final mark between 80 and 100.
Mark	A number indicating a student's performance in an assessment activity or a course. Raw marks, which may be scaled, become final marks after approval by the Delegated Authority. Marks range from 0 to 100.
Program	A structured sequence of study, undertaken in one or more Colleges of the University, normally leading to an award. Programs are controlled by one or, in the case of combined programs, two academic authorities.
Status	Students admitted to a program at the University, or transferring between programs at the University, may be granted status (credit) in the new program on the basis of previous tertiary studies.
Unit	This is an indicator of the value of a course within the total program. Most courses are valued at 6 units.

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