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## AI SINGAPORE RESEARCH PROGRAMME

### AI SINGAPORE PhD FELLOWSHIP PROGRAMME 2021

#### 1. About the Programme

- 1.1 The AI Singapore (AISG) Research Programme supports top artificial intelligence (AI) research talent in pursuing full-time PhD studies in Singapore-based autonomous universities (AUs)<sup>1</sup>.
- 1.2 The objective of the programme is to nurture and train local AI talent to be able to perform advanced fundamental AI research and produce state-of-the-art AI algorithms, models and systems. Eventually, we hope that these talents will contribute to the other pillars of AI Singapore, the local AI eco-system and society.
- 1.3 The AISG PhD Fellowship Programme welcomes all nationalities to apply. AISG PhD fellows will be provided with a competitive stipend of up to S\$6,000 monthly, on top of other allowances and full tuition fee support for up to four years of study at Singapore-based AUs.
- 1.4 AISG PhD fellows are to publish novel and significant fundamental AI research publications at top-tier venues, as defined by AISG, from the point of award until their PhD candidature period concludes. Additionally, AISG PhD fellows can look forward to participating in initiatives from the other pillars of AISG such as 100Experiments, AI Makerspace, AI Grand Challenges and AI Technology Challenges.
- 1.5 Interested applicants or existing PhD candidates with strong interest in AI fundamental research are highly encouraged to apply for the AISG PhD Fellowship.

#### 2. PhD Research Focus Areas

- 2.1 AISG PhD fellows supported by the AISG PhD Fellowship Programme are highly encouraged to conduct research on advanced fundamental AI on the following themes:

- 2.2 **Theme One: Collaborative AI**

This theme centres on advancing the **state of the art in collaborative AI**; the following examples are sub-topics of interest:

- i. Human-AI Collaboration or AI-AI Collaboration
- ii. Knowledge Representation

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<sup>1</sup> *Autonomous Universities (AUs)*: National University of Singapore (NUS), Nanyang Technological University (NTU), Singapore Management University (SMU), Singapore University of Technology and Design (SUTD).

- iii. Transfer Learning

### 2.3 Theme Two: Trustworthy and Explainable AI

This theme centres on advancing the **state of the art in trustworthy or explainable AI**; the following examples are sub-topics of interest:

- i. Accountability in Intelligent Systems
- ii. Safe, Fair and Robust AI System Development
- iii. Transparent or Explainable AI System Development
- iv. Explainability and Trust (Safe, Fair, Robust) Assessment

### 2.4 Theme Three: Resource-Efficient AI

This theme centres on advancing the **state of the art in resource efficient AI**; the following examples are sub-topics of interest:

- i. Learning from Small Data Sets
- ii. AI Understanding of Design and Creation
- iii. Human AI Co-Design
- iv. Knowledge Representation with Complex Priors or Measurements

### 2.5 Theme Four: Privacy-Aware AI

This theme centres on advancing the **state of the art in privacy-aware AI**; the following examples are sub-topics of interest:

- i. Federated Learning
- ii. Privacy-Aware AI Algorithms

### 2.6 Theme Five: Continuous Learning AI

This theme centres on advancing the **state of the art in Continuous Learning AI**; the following examples are sub-topics of interest:

- i. Self-Supervised Learning
- ii. Lifelong Learning

2.7 Each AISG PhD fellow is highly encouraged to **address one of the five AI themes listed above**. The AISG PhD fellow is **not limited to the proposed sub-topics**. AISG PhD fellows are encouraged to have a clear research focus on a single theme instead of multiple themes.

2.8 Alternative AI themes for AISG PhD fellows to pursue will only be allowed **if s/he has**

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**exceptional credentials<sup>2</sup> and/or strong interest<sup>3</sup> in a particular AI fundamental research area.** Approval from the AI Research Chief Scientist is required for AISG PhD fellows to pursue an alternative theme.

- 2.9 For any changes in the research theme, regardless among the themes listed or alternative themes, the AISG PhD fellow is required to inform AI Singapore in writing.

### 3. PhD Fellowship Details

#### 3.1 Coverage and Post-Service Obligations

3.1.1 The AISG PhD Fellowship Programme will support each AISG PhD fellow for a duration of up to four (4) years of studies:

- i. Full local tuition fees
- ii. Monthly sustenance allowance<sup>4</sup>  
For Singaporeans, it is up to \$6,000.  
For Singaporean Permanent Residents (PR), it is up to \$5,500.  
For other nationalities, it will be up to \$5,000.
- iii. CPF contribution<sup>5</sup> for Singaporeans only
- iv. Other allowances<sup>6</sup>: Computer, conference travels<sup>7</sup>, miscellaneous

3.1.2 A two (2) year<sup>8</sup> service obligations in Singapore-based companies<sup>9</sup> will be required for international students who are non-Singaporeans or non-Singaporean PRs. If the PhD student is to obtain citizenship or permanent residency in Singapore during the fellowship supported period, the service obligations will be removed based on the relevant supporting documents submitted to AISG.

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<sup>2</sup> An AISG PhD fellow with exceptional credentials has a track record of publishing in top-tier AI conferences/journals as a main contributor (e.g., first author), a strong academic track record (top 5% in undergraduate and/or post-graduate studies) at a top-tier university, and/or impactful AI projects completed.

<sup>3</sup> Strong interest is defined as research interest in an area explained through his/her research statement and past experience in industry and/or academia. Otherwise, a strong recommendation from his/her current supervisor.

<sup>4</sup> Monthly sustenance allowance and CPF contribution (only for Singaporeans) will be provided with effect from the date of obtaining Singapore citizenship or a Singapore permanent residency. Relevant supporting documents are required to facilitate the change of allowance rate and CPF (if applicable).

<sup>5</sup> Central Provident Fund (CPF) contributions shall be provided at a rate pegged to the prevailing employer's contribution rate set by CPF, which is on top of the monthly sustenance allowance.

<sup>6</sup> Other allowances are on the reimbursement basis of twice a year, raised by the host institution and subject to AI Singapore's cap rate.

<sup>7</sup> Conference travel support is subject to AU's prevailing travel guidelines and AI Singapore's requirements on travel support.

<sup>8</sup> A 2-year service period is not inclusive of any periods of no-pay leave and frictional unemployment.

<sup>9</sup> Singapore-based companies refers to local companies and international companies that have an office based in Singapore and are registered with the Accounting & Corporate Regulatory Authority (ACRA).

3.1.3 AISG PhD fellows pursuing an AI-related full-time PhD in Singapore-based AUs are eligible for funding under the AISG PhD Fellowship Programme after evaluation by AISG. The number of years funding is provided is determined by the date of application to AISG and AU admission date (refer to point 3.4.7). There is **no funding support** for:

- i. Applicants intending to pursue an AI-related PhD in overseas AUs or;
- ii. Candidates pursuing an AI-related PhD in overseas AUs.

3.1.4 Overview of differences across various candidates:

	Monthly Sustenance Allowance	CPF Contribution <sup>5</sup>	Service Obligations (post-graduation)
Singaporean	S\$ 6,000	Yes	NA
Singapore PR	S\$ 5,500	No	NA
International Student (without Singapore PR)	S\$ 5,000	NA	Yes (2 Years)

### 3.2 Deliverables from Awarded Fellows

3.2.1 From the point of award and until end of candidature, each AISG PhD fellow is expected to have at least four (4) publications published, with the fellow as the main/primary author. The four (4) publications are required to be in the main/technical track of the conferences or journals listed in AI Singapore’s latest “Top 10% NRF Approved List” or “Clarivate’s Science and Technology” list. The publications are required to acknowledge AISG as per AISG’s guidelines in order for the publication to be recognised as a successful count.

3.2.2 For publications to be considered, AISG PhD fellows **MUST** include the acknowledgement statement strictly as follows:

#### **Acknowledgement Statement - General**

*“This research/project is supported by the National Research Foundation, Singapore under its AI Singapore Programme (AISG Award No: AISG-PhD/2021-01-XXX[T]).*

#### **Acknowledgement Statement – Multiple Funding Sources**

For publications with multiple funding sources, the name of each source of funding are to be placed in order of the funding value (assuming that the maximum funding is from NRF Singapore, AI Singapore):

*“This research/project is supported by the National Research Foundation, Singapore under its AI Singapore Programme (AISG Award No: AISG-PhD/ 2021-01-XXX[T]), <other funding source name> and <other funding source name>.”*

3.2.3 All publications published by AISG PhD fellows are to be reported on a **half-yearly basis** from the point of award by AISG until the PhD candidature concludes. Hence, in the event

an AISG PhD fellow is to continue in a fifth year and beyond (prior to the date of degree conferment) without the support of AISG, s/he is expected to acknowledge AISG in all publications (if any), and inform AISG until the date of degree conferment.

3.2.4 The AISG PhD fellow will receive up to S\$5,000 in travel grant support if s/he is the main/primary author of a paper in the top-tier list below. There is no restriction on the frequency of travel support for papers published in the top-tier list. This is to ensure Singapore’s visibility and strong presence in top-tier AI conferences and to maintain Singapore’s field-weighted citation impact.

3.2.5 The top-tier AI main/technical conferences suggested below are subject to annual revision by AI Singapore:

S/N	Acronym	Conference Title
1	AAAI	AAAI Conference on Artificial Intelligence
2	ACL	Annual Meeting of the Association for Computational Linguistics
3	CVPR	Conference on Computer Vision and Pattern Recognition
4	EMNLP	Conference on Empirical Methods in Natural Language Processing
5	ICCV	International Conference on Computer Vision
6	ICML	International Conference on Machine Learning
7	IJCAI	International Joint Conference on Artificial Intelligence
8	KDD	SIGKDD Conference on Knowledge Discovery and Data Mining
9	NeurIPS	Conference on Neural Information Processing Systems

3.2.6 For other AI conferences listed within the “Top 10% NRF Approved List”, the AISG PhD fellow will receive up to S\$2,000 in travel grant support. The frequency of travel support is limited to four (4) conferences throughout the award period. This travel grant support is applicable only if s/he is the main author of his/her paper.

### 3.3 Participation in AI Singapore’s Programme

3.3.1 The awarded AISG PhD fellows are required to participate in AI Singapore’s programme initiatives, such as 100 Experiment Projects, AI Makerspace, AI Technology Challenges, Grand Challenges or other AI Singapore’s initiatives.

### 3.4 Transfer from Other Scholarships

3.4.1 Existing PhD candidates who fulfil the eligibility criteria mentioned in section 4.2 are welcomed to apply to AI Singapore’s PhD fellowship programme.

3.4.2 The budget provided to transfer PhD candidates are pro-rated accordingly from the full-support of a 4-year PhD programme. There will not be any back-claiming of an AISG PhD fellowship for funds utilised prior to the award.

3.4.3 Successful AISG PhD fellows are still required to fulfil their previous scholarships’ pro-

rated service obligations if applicable. Depending on the terms and conditions of the previous scholarship providers, AISG PhD fellows may be able to serve their remaining service obligations during their term with the AISG PhD fellowship programme. This is to be stated upfront and approval must be sought from previous scholarship providers. The Host Institution will need to inform AISG on the final arrangement of the students' service obligations.

- 3.4.4 The deliverables required by AI Singapore **will not be pro-rated** from the date of transfer. Hence, transfer PhD candidates are still required to fulfil the deliverables as per section 3.2 and participate in AISG programmes as per section 3.3.
- 3.4.5 If the AISG PhD fellow is an international student, the service obligations will be pro-rated from the date of transfer.
- 3.4.6 The awarded AISG PhD fellow must not be an existing scholarship holder at the start date of the AISG PhD fellowship award indicated by AI Singapore.
- 3.4.7 The overview of support for transfer for AISG PhD fellows is given below:

AISG PhD Fellowship Programme Intake	Existing PhD Candidates' AU Admission Intake	AISG Support
<b>August 2021</b>	January 2021	AISG support will commence from their 2 <sup>nd</sup> year of studies (January 2022)  Total of <u>3 years</u> of funding starting from January 2022.
	August 2020	AISG support will commence from their 2 <sup>nd</sup> year of studies (August 2021)  Total of <u>3 years</u> of funding starting from August 2021.
	January 2020	AISG support will commence from their 3 <sup>rd</sup> year of studies (January 2022)  Total of <u>2 years</u> of funding starting from January 2022.
	August 2019	AISG support will commence from their 3 <sup>rd</sup> year of studies (August 2021)  Total of <u>2 years</u> of funding starting from August 2021.
	January 2019 or earlier	Not eligible for transfer

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## 4. Eligibility Criteria

4.1 At the point of application, **the interested applicant** must fulfil the following requirements:

- i. Satisfy the criteria and gain admission (August 2021 intake) to a AI-related PhD programme in one of the following Autonomous Universities' (AUs) faculty/school:
  - a. NUS School of Computing; and Faculty of Engineering (Computer Engineering)
  - b. NTU School of Computer Sciences and Engineering;
  - c. SMU School of Information Systems
  - d. SUTD Information Systems Technology and Design Pillar
- ii. Has obtained at least a second Upper Class Honours degree or equivalent in a relevant discipline.

4.2 **An existing PhD candidate** who is currently pursuing in an AI-related PhD programme (four-year programme) is welcomed to apply if he/she satisfies ALL the criteria:

- iii. Is pursuing a AI-related PhD programme in one of the following Autonomous Universities' (AUs) faculty/school:
  - a. NUS School of Computing; and Faculty of Engineering (Computer Engineering)
  - b. NTU School of Computer Sciences and Engineering;
  - c. SMU School of Information Systems
  - d. SUTD Information Systems Technology and Design Pillar
  - e. Other proposed faculty/school proposed beyond the list above is subject to AI Singapore's evaluation and assessment.
- iv. Has at least two (2) years remained from his/her four-year PhD programme (based on the intake that he/she was admitted to the AU)
- v. Ensures his/her current scholarship allows a transfer of scholarship support. This should be verified by the host institution's graduate school office before his/her names are submitted to AISG.
- vi. Displays a track record of AI publications in top-tier main track AI conferences and journals will be highly considered. The applicant must be a main contributor (e.g. first author) of the publications.
- vii. Has passed his/her PhD qualifying examinations and a CAP not below 4.0 out of 5.0 system or 3.2 out of 4.0 system (applies to PhD candidates who are at the end of 2<sup>nd</sup> year of studies).

4.3 Other faculty/school proposed beyond the list above is subject to AI Singapore's evaluation and assessment.

4.4 The above eligibility criteria are not exhaustive and AISG may include additional selection criteria based on prevailing fellowship policies. The AISG PhD fellowship terms and conditions may be amended from time to time based on AISG's grantor guidelines.

## 5. Selection Process and Evaluation Criteria

- 5.1 Applicants or candidates are selected based on their strong research interest in AI core technical areas and their motivation to do novel and significant AI research works and publish them in the top-tier AI conference/journals. Hence, a clear articulation of novel and significant proposed research directions in his/per personal statement is important.
- 5.2 Applicants or candidates will also be assessed through their **academic excellence and/or awards received** (academic and technical) as per the application submission.
- 5.3 Applicants and candidates with **(1) existing publications in top-tier AI conference or journals** and/or **(2) relevant industrial experience and exposure** and/or **(3) recommendations letters from established researchers, faculty members or technical supervisors** will be favourably considered.
- 5.4 All decisions are final and no appeals will be entertained.

## 6. PhD Fellowship Programme Timeline

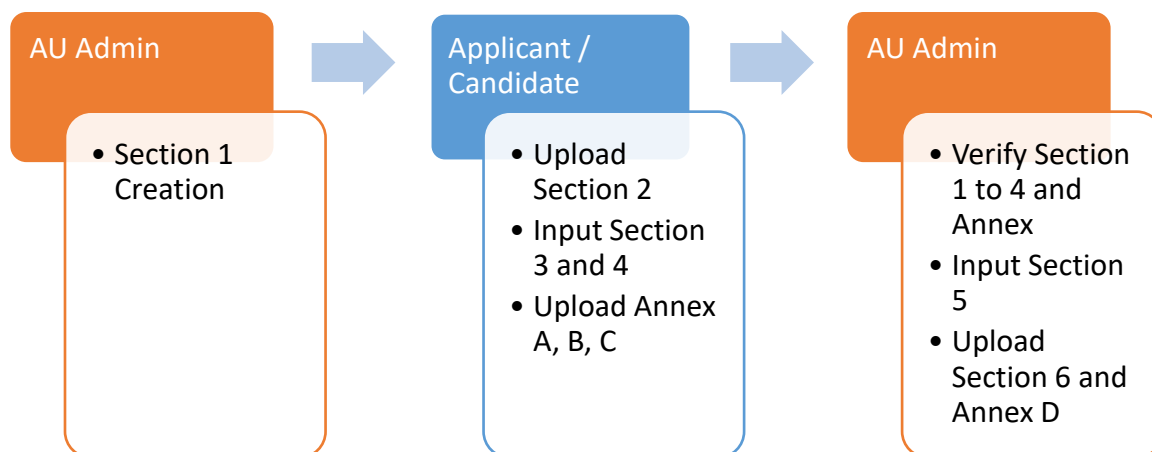
- 6.1 The schedule for the **PhD Fellowship Programme 2021** is as follows:

Event (PhD Admission August 2021)	Dates
Announcement of Programme and Opening Date for the Submission of Applicants / Candidates	16 February 2021
Closing date for Submission of Applicants / Candidates	29 March 2021
Evaluation and Selection of Applicants / Candidates	April 2021
Release of Outcome and Award	May 2021
PhD Fellowship Commencement (August 2021 / January 2022)	August 2021 / January 2022

## 7. Application / Contact

- 7.1 The AI Singapore Research PhD Fellowship Application Portal is available from **16 February 2021**, on <https://grantportal.aisingapore.org/>
- 7.2 Individual Autonomous Universities (AUs) should submit the AI Singapore PhD Fellowship Programme application form with all the sections duly filled by the stipulated deadline in the following sequence:





- i. **[By AU's officer]** Create an basic account of the applicant / candidate details through the fields available (**Section 1**).
- ii. **[By applicant / candidate]** Upload individual personal statement (Section 2) in a separate PDF.
- iii. **[By applicant / candidate]** Input values through the portal fields (Section 3 and 4).
- iv. **[By applicant / candidate]** Upload individual CV (Annex A), education certifications (Annex B) and detailed awards and publications (Annex C) in separate PDFs.
- v. **[By AU's officer]** Verify the details (Section 1 to 4, Annex A, Annex B and Annex C) and input value through the portal fields (Section 5) for transfer candidates.
- vi. **[By AU's officer]** Endorse and upload Section 6 endorsement page and Annex D in separate PDFs.

7.3 Only complete applications with the endorsement of the relevant institutional authority / director of graduate school (or equivalent), will be accepted by AI Singapore.

7.4 Each eligible institution<sup>10</sup> **must rank the applicants / candidates in decreasing order of preference** for strong considerations. Applicants / candidates will be reviewed accordingly across all AUs submission ranking **based on merits** of the applicant / candidates.

7.5 New applicants and transfer candidates should be ranked separately.

7.6 Additionally, each eligible institution must follow the submission quota (August 2021 intake) below:

- i. For New Applicants,
  - no more than forty (40) applications each from NUS and NTU;

<sup>10</sup> Applicable to Autonomous Universities (AUs) offering PhD programme: National University of Singapore (NUS), Nanyang Technological University (NTU), Singapore Management University (SMU), Singapore University of Technology and Design (SUTD)

- no more than twenty (20) applications each from SMU and SUTD.
- ii. For Transfer Candidates,
  - no more than twelve (12) applications each from NUS and NTU;
  - no more than eight (8) applications each from SMU and SUTD.

7.7 Each transfer candidate is a single headcount. There is no partial headcount of transfer candidate in the submission quota.

7.8 Subject to the above criteria, for a combination of new application and transfer cases, each institution may only submit:

- i. no more than forty (40) applications each from NUS and NTU;
- ii. no more than twenty (20) applications each from SMU and SUTD.

7.9 The table below summarizes the annual submission limit (August 2021 intake):

Submission Quota	No. of applicants / candidates submitted per institution		
	New Applicants	Transfer Candidates	Maximum Submission (Combination)
NUS / NTU	40	12	40
SMU / SUTD	20	8	20

AUs can submit any permutation provide that submission quotas are met. The following list are examples of possible permutation on the submission quota of August 2021.

Submissions quota of **NUS or NTU** in the following permutation examples:

For August 2021		Total Submission Quota
New Applicant	Transfer Candidate	
28	12	40
25	2	27
40	0	40

Submission quota of **SMU or SUTD** in the following permutation examples:

For August 2021		Total Submission Quota
New Applicant	Transfer Candidate	
12	8	20
14	1	15
20	0	20

7.10 For more information, please contact [research@aisingapore.org](mailto:research@aisingapore.org).

## 8. Terms and Conditions of the Award

- 8.1 For AISG awarded fellows who are not Singapore citizens / permanent residents, the offer of an AISG fellowship is conditional upon the AISG PhD fellow being issued a valid student pass by the Singapore Immigration and Checkpoint Authority and maintain a valid student pass for the duration of PhD candidature period.
- 8.2 AISG awarded fellows will have to sign in the Statement of Acceptance (SOA) along with the Host Institution's appointed signatory if s/he decide to take the award. Additionally, the fellow is required to sign a letter of undertaking with the Host Institution.
- 8.3 AI Singapore will disburse funds on a reimbursement basis. Host institutions shall submit requisitions for claimable expenses permitted and granted under the AI Singapore PhD Fellowship **to AI Singapore on a half-yearly basis** using the forms provided. Requisitions shall include detailed schedules of expenditure incurred for the previous period, as certified by the chief financial officer or an authorised nominee.
- 8.4 Supervisor(s) of the approved candidate is/are obligated to provide written description of candidate's progress along with each half yearly expense claim.
- 8.5 No funds shall be disbursed for awarded fellows and his/her relevant expenses unless:
- iii. The respective research compliance approvals (where applicable) have been obtained from the appropriate board/office for its research directions.
  - iv. Submission of supervisors/co-supervisors<sup>11</sup> names are provided prior to the second claim or first six-months of the awarded date of fellowship, whichever is earliest.
  - v. Satisfactory performance of the awarded PhD fellows by (1) passing the Qualifying Examination and (2) maintaining a GPA of 4.0 out of 5.0 system or 3.2 out of 4.0 system.
- 8.6 Awarded PhD fellows are not allowed to engage in any other remunerated employment during AISG's supported period. For pro-bono consulting and other exceptional cases, s/he is required to notify and obtain AI Singapore's approval.
- 8.7 Graduated AISG PhD fellows are required to report their employment status every 6 months of the post-two years for tracking purposes. Graduated AISG PhD fellows who are not Singaporean or Singapore permanent residents are required to submit a letter of employment (full-time) from his/her employer after commencement of employment to his/her AU institution and AI Singapore along with a copy of his/her employment pass for Singapore.
- 8.8 Any false reporting will constitute reason to terminate the scholarship and make the fellow

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<sup>11</sup> The supervisor/co-supervisors' name(s) are to be from the following Institution of Higher Learning (IHLs): Agency for Science, Technology and Research (A\*STAR), Singapore Management University (SMU), Singapore University of Technology and Design (SUTD), National University of Singapore (NUS) and Nanyang Technological University (NTU)

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liable for liquidated damages as stated in point 5.1. AI Singapore will review those who are unable to complete service obligations due to unforeseen circumstances, on a case-by-case basis.

- 8.9 AISG PhD fellows who wish to terminate their bond are required to pay liquidated damages (LD) to AISG. More information on the LD will be provided at the later date together with the SOA and the letter of undertaking.
- 8.10 AI Singapore will consider appeals due to extraordinary circumstances for partial LD waivers on a case-by-case basis.
- 8.11 **Force Majeure:** If for any reason beyond the university's and/or the AISG PhD fellow's reasonable control, including but not limited to strikes; labour dispute; statutes, regulations, acts, orders or directions of government authorities; government requisition; civil disorder; disasters; acts of war; acts of God; fires; flood, health, safety, epidemic, disease or any other emergency condition that leaves the university or the fellow unable to perform his/her obligations as per the terms and conditions, AISG may consider a full LD waiver after assessment. Force majeure will exclude any foreseeable or known events. In no event shall AISG be liable for consequential damages of any nature for any reason whatsoever.
- 8.12 The terms and conditions of the AISG PhD fellowship may be amended from time to time based on AISG's grantor guidelines.