# NUS Graduate School for Integrative Sciences and Engineering

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# Graduate Education

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## 3.1 Research Programmes

NGS encourages research in or at the intersection of any of the following areas:

Engineering:

Biomolecular, Chemical, Computer, Electrical, Environmental, Manufacturing, Mechanical, Materials, Nanotechnology, Robotics

Information Technology:

Bioinformatics, Computational Biology, Data Mining, Infocommunications, Interactive and Digital Media

Life Sciences:

Biochemistry, Cancer Research, Cell and Molecular Biology, Developmental Biology, Genetics, Genomics, and Proteomics, Immunology, Lipidomics, Pharmacology, Physiology, Regenerative Medicine, Stem Cell Research, Structural Biology

Physical Sciences:

Biological Physics, Chemistry, Soft-condensed Matter Physics, Nonlinear Dynamics and Complex Systems, Nano- and Molecular Electronics, Photonics, Phononics, Thermoelectrics, Quantum Information and Quantum Computation

Please visit: *http://www.nus.edu.sg/ngs/research.html* for comprehensive information on our research.

In addition, we offer research specialisation via the following networked groups

1) Neuroscience
2) Computational Biology
3) Interactive and Digital Media
4) Carbon Science and Technology
5) Bioimaging Training Program
6) Environmental Life Sciences Engineering

Please visit http://www.nus.edu.sg/ngs/NGS_Networked_Grps.html for details.

NGS encourages flexible thinking. Through courses and laboratory rotations early on in the degree, students have the opportunities to acquire new knowledge and tools in areas related to their Ph.D. projects.

## 3.2 Degrees/Programmes Offered

NGS offers the following full-time graduate degrees by research:

Doctor of Philosophy (in Integrative Sciences and Engineering)

It also offers the following Ph.D. degree programmes.

Joint NUS-Imperial College Ph.D. Programme
The NUS-Imperial Joint Ph.D. Degree is an award conferred by both institutions, which allows Ph.D. students to spend half of their time at each institution. This programme is particularly aimed

at those who want a joint degree from two leading universities or whose research would benefit from the expertise of the two academic research groups with complementary strengths or engaged in an inter-disciplinary collaboration. This programme is a great way of taking research forward to an international level.

Refer to:
*http://www.nus.edu.sg/ngs/NUS_Imperial_College_programme.html*

NUS Ph.D.-MBA

Students in the NUS programme work on a Ph.D. in science, engineering or medicine and an MBA concurrently. Successful applicants will be offered a scholarship covering the tuition fees for both the Ph.D. and the MBA. They will also be offered a stipend for living expenses of S$ 3,200 per month (tax free), as well as allowances for books, a computer and for conferences. In the 1st year students typically do course work related to their Ph.D.. In the 2nd year, students complete a first internship lasting around 3 months, for example in the summer between year 1 and year 2. Students also finish course work and sit their Ph.D. Qualifying Examination, as well as selecting two advisers, one of whom should be from NGS, the other may be in any NUS department or school, or even external to NUS. Students then start their MBA in the 1st semester of the 3rd year of study. They do this as full time students in the NUS Business School, along with all other full-time MBA students. From the 2nd semester of the 3rd year onward, students continue their Ph.D. research full-time and finish course work related to their MBA in part time mode. A second internship is taken at any time during years 3 to 5. Upon successful defense of a thesis and the fulfillment of the requirements for the MBA, students are conferred a Ph.D. and an MBA degree. Students may graduate with only a Ph.D., but not with only an MBA. The Ph.D.-MBA is designed to take students between 4 and 5 years to complete.

Refer to:
*http://www.phd-mba.nus.edu.sg/*

### 3.2.1 Degree Requirements

The NGS Scholarship (NGSS) Ph.D. Scholarship is awarded to talented students with an aptitude for innovative, high-calibre Ph.D. research.

Terms

- Five-year Ph.D. programme
- Four-year Ph.D.-only award
- All university fees, except one-time registration fee charged upon enrolment and thesis exam fees
- Monthly stipend of S$3,200 for four years
- Allowances for ITware, books, international conferences
- Cross-disciplinary research at the forefront of science, engineering, computing, and related aspects of medicine
- Opportunities for research projects based both in Singapore, and the USA/Europe/Japan/China/Australia
- No contractual bond

Eligibility

Open worldwide to graduates

- with excellent research potential, and at least a very good Upper 2nd Honours, or equivalent qualifications
- from all branches of life, physical, computer and engineering sciences, medicine, and interactive & digital media

Other Conditions

- Students are not eligible for the President's Graduate Fellowship (PGF).
- Award is renewable, subject to satisfactory academic performance of CAP ≥ 3.8 at the end of every semester.
- GRE is compulsory for students applying from overseas. Only strongly recommended for graduates from local institutions, e.g. NUS or NTU.
- TOEFL is compulsory (ONLY applicable for applicants whose native tongue or medium of undergraduate instruction is not in English).

Closing Dates

Aug intake: 15 November (of the previous year)/15 March (of the same year)
Jan intake: 15 May (of the previous year)

Apply through our website today: *https://inetapps.nus.edu.sg/gda/common/newlogin.aspx*

The A*STAR Graduate Scholarship (AGS) is a collaboration between the A*STAR Graduate Academy (A*GA) and NGS. It offers a "4+2" scholarship - comprising a four-year Ph.D. study tenable at NUS, and a two-year post-doctoral fellowship (PDF) at a top overseas university or research laboratory in the scholar's chosen field. The Ph.D. degree is awarded by NUS.

Terms

- Monthly stipend of S$3,300 up to four years
- All university fees
- Allowances for computer, thesis, books and conferences
- Opportunities for overseas attachment

Eligibility

- Singaporeans, Singapore PRs, and nationals of ASEAN countries (successful candidates who are Permanent Residents or nationals of ASEAN countries are expected to take up Singapore citizenship)
- Graduates with at least 2nd Upper Honours and good 'A' Level results

Other Conditions

- May not hold concurrently any other scholarship or fellowship
- Up to three-year service commitment to work in challenging employment in the RIs upon completing the PDF
- All candidates are encouraged to apply with their GRE test scores. Applications without GRE test scores will still be considered but successful applicants will have to satisfy the GRE requirement prior to them embarking on their Ph.D. studies.

Closing Dates:

Jan intake : 15 May (of the previous year)
Aug intake: 15 November (of the previous year)

(Note: Students may be allowed to register and commence their research earlier if they obtain the A*STAR Graduate Scholarship.)

Please refer to our website: *http://www.nus.edu.sg/ngs/AGS.html* for Scholarship details.

Coursework Requirements

The coursework requirements are applicable to all AGS and NGSS students, comprising the following:

(a) Coursework

All students are required to undertake a one-year equivalent coursework (min 30 MCs) to be conducted by NUS faculties/schools and /or RIs.

Students are to undertake the 3 compulsory NGS courses:

GS6001 (Research Ethics and Scientific Integrity),

GS5002 (Academic Professional Skills and Techniques) to be read latest by the 3rd semester upon enrolment,

GS6889 (Academic Professional Skills II) to be read preferably during the second semester of Year 3 or the first semester of Year 4.

- All modules taken must be level 5000 or 6000.
- Levels 1000 - 4000 are undergraduate modules and can only be read as "AUDIT". Students who audit a module will not receive a final grade. Audited modules will not appear on the student's transcript / result slip. No record of attendance will be issued to auditors of a module. Note that it is subject to the host Faculty's approval whether students are allowed to audit a module.
- In special cases, NGS may give approval to Level 4000 modules to be taken as S/U, but only in instances where the background of the students require this. E.g. a student with excellent qualifications in Physics who needs to undertake basic training in Cell Biology to carry out his thesis project.
- Graduate modules classified as S/U

(i) This is applicable to all NGS students who wish to take graduate modules outside their main undergraduate discipline, to be graded on a S/U system and NOT count towards the CAP.

(ii) Student may request for up to 3 modules (12 MCs), with the support of their main supervisor at the start of each semester.

(iii) The application has to be submitted within the 1st month from the commencement of the module.

(iv) Any request for changes to the modules after the examination results release such as changing grading basis from S/U to grade, grade to S/U or deleting a module is NOT allowed.

(b) Undergraduate Teaching / Research Supervision

Undergraduate Teaching is compulsory for all students. Students are required to clock a minimum of 40 hours undergraduate teaching, normally to be completed by the end of the second year of enrolment at NGS. Feedback will be required within four weeks of the teaching being completed. No MCs will be allocated for teaching.

Note: At least 20 hours should be practical demonstrating/ lecturing/tutorials.

Marking hours cannot be used as part of teaching hours. Only direct teaching or demonstrating can be clocked.

For Research Supervision, students are encouraged in the later stages of their research career to participate in supervision of JC, Honours and UROP students undertaking research projects in their host institution, normally in the laboratory of their Main Supervisor or Co-Supervisor (if any, and this is optional). This can be used to fulfil up to 25% of the 40 hours teaching requirement, provided it can be adequately documented. The Supervisor and the students being supervised will certify the quality of the supervision.

More details on Coursework Requirements, please visit the NGS website at:
http://www.nus.edu.sg/ngs/course_reqd.html

(c) Laboratory Rotation

• It is highly recommended for students.

• 2 MCs will be awarded per rotation in laboratories outside that of the supervisor. The rotation has to last for at least 2 months and the student's performance certified satisfactory.

(d) Seminar Series

This is an optional module. The main purpose of this module is to give graduate students the opportunity to participate in scientific seminars/exchanges in a professional manner and it is also to hone their presentation and communication skills. It will also serve as a platform for the exchange of ideas and updating of information which are important for advancement in research.

It is also an avenue for students who wish to participate in seminars organised by the Research Institutes, which will be held over a one year period.

Students should attend at least 30 seminars and present in at least 1 seminar. After each seminar attended, student has to prepare learning journals/logs for all the seminars attended, including the seminar he presents. Student's presentation slides will have to be submitted and together, these will be assessed/graded by a representative from the NGS curriculum committee as well as the RI coordinator (for students who take the seminars organized by RI).

A 'Satisfactory/Unsatisfactory' grade and 4 Modular Credits will be awarded on the basis of attendance, presentation and document submission.

Note : The seminars should be an officially-registered seminar series held by a Faculty/School/Research Institute (RI) and they do not include ad-hoc seminars. Students should check with the NGS Office if they are interested to take on the Seminar Series module.

(e) NGS Buddy System

Students (especially those in the Year 2 or 3 of their study) are encouraged to serve as senior buddies to the freshmen.

Students are required to meet with the freshman at least 6 times per academic year (at least 3 times per semester). This can be used to fulfil 10 hours from the 40 hours of the NGS teaching requirements, after at least 1 year being buddy with the freshman and with satisfactory feedback from the freshman.

Note: Both the senior buddy and the freshman have to report their meetings in a log / feedback form, 2 times per academic year (once per semester) and submit the completed forms to the NGS office. (The deadline for submission of feedback form is 1 December for Semester 1 and 1 July for Semester 2).

(f) Criteria for candidature and graduation:

(i) Coursework grades should not fall below a Cumulative Average Point (CAP) of 3.8. Higher grades in certain modules may be required.

(ii) Students whose CAP falls below 3.8 will be issued with a warning letter at the end of that semester for poor performance. The letter will state that the students' candidature may be terminated at the end of the following semester if his/her CAP remains below 3.8. Students will be counselled by members of SAGE.

(iii) To graduate, a student must obtain a CAP of 3.8 and above.

(g) CAP Requirements and Policies

1. CAP review for students will be done at the end of every Semester 1 and Semester 2 of the Academic Year after the official release of the examination results (excluding Special Term 3 and 4).
2. NGS does not practice the Best CAP Calculation policy. All modules read will be used for the computation of the students' CAP, unless the module(s) is graded as S/U or CS/CU.
3. Students whose performance is under review by NGS are required to read at least 1 module every semester.
4. For students who fail to meet the CAP requirement of 3.80 for every semester, appropriate actions will be taken as follows:

1st academic warning:

1. A warning letter will be issued via email (cc. supervisor).

2nd academic warning:

1. A warning letter will be issued via email (cc. supervisor).
2. The Educational Allowances (EA) will be suspended.

3rd academic warning:

1. A warning letter will be issued via email (cc. supervisor).
2. The Educational Allowances (EA) will be suspended.
3. For students with:

***a) CAP between 3.50 - 3.79***

Reduction of Research Scholarship (RS) stipend to faculty level:

S$2,000 per month for International Student

S$2,200 per month for Singapore Permanent Resident

S$2,300 per month for Singapore Citizen

***b) CAP below 3.50***

Termination of RS and Candidature by Registrar's Office (RO)

**** NGS will not consider any appeal from students under the 2nd and 3rd academic warnings for waiver of any penalty as stated above.***

For students who have already been warned 3 times (with CAP between 3.50 – 3.79 and RS stipend at Faculty level) and achieve a CAP of less than 3.80 in the 4th semester:

1. Termination of RS and Candidature by Registrar's Office (RO)

*The RO will send a dismissal letter to student (cc to supervisor).

Notes:

1. The suspension of the EA and the reduction of RS stipend will take effect from the date of release of the exam results of the previous semester to the date of release of the next exam results in the following semester of the academic year.
2. For students who are funded by other sources - the NGS will notify the relevant funding body to recommend similar penalties.

Appeal Procedures for Re-instatement of Candidature – applicable to only dismissed/terminated students with CAP between 3.50 - 3.79

a. Students who were dismissed from their candidature due to poor academic standing and who wish to appeal for re-instatement, should submit their appeal to NGS within two calendar weeks of the last day of the release of each semester's examination results (with support from supervisor, providing information on research performance, publications list and any other relevant information to support the appeal). NGS will not consider any appeals after that.
b. Students with potential to be considered for re-instatement will be asked to attend an interview.
c. Students will be notified of decision by NGS. RO will write to inform the student on the re-instatement of candidature and the student must accept the offer for re-instatement and reply to RO by the deadline given in the letter, failure of which will cause the offer to lapse.

Conditions for Re-instatement of Candidature

a. NGS will not provide Research Scholarship (RS) stipend.

b. NGS will not provide Tuition Fee (TF) subsidy.
c. NGS will not provide Educational Allowances (EA).
d. Students who are re-instated should still be reading course(s) in the current semester to improve on their CAP to >3.8, failure of which will result in a 2nd dismissal (with no appeal for second re-instatement). The student will have to achieve the minimum CAP required for continuation and graduation in the current semester.

* For students who have improved their CAP to >3.8, NGS will consider on a case by case basis to re-instate their RS/TF/EA.

Grading System and the Cumulative Average Point

Grades and their respective grade points given are as follows:

| Grade | Grade Point |
|---|---|
| A+ | 5.0 |
| A | 5.0 |
| A- | 4.5 |
| B+ | 4.0 |
| B | 3.5 |
| B- | 3.0 |
| C+ | 2.5 |
| C | 2.0 |
| D+ | 1.5 |
| D | 1.0 |
| F | 0.0 |

## 3.2.2 Financial Assistance and Awards

Students who are offered a place in our School will be offered a scholarship, either through

- NGS Scholarship (NGSS)
- A*STAR Graduate Scholarship (AGS)

The following are the terms of the scholarship:

For NGSS:

| | |
|---|---|
| TERMS | • Monthly stipend of S$3,200 during the Ph.D. for four years<br>• Full tuition fees<br>• Mandatory miscellaneous fees except one-time registration fees charged upon enrolment and thesis examination fees<br>• Other allowances including<br>(i) Computer<br>(ii) Book allowance<br>(iii) Conference allowance<br>• Not eligible for PGF<br>• No bond |

| | |
|---|---|
| | • Student must commit to Ph.D. from the outset, cannot exit with M.Sc.<br><br>Successful candidates will be given support for up to four years of academic pursuit, leading to a Ph.D. Award this is renewable on an annual basis, subject to good progress. |

For AGS:

| | |
|---|---|
| TERMS | • Monthly stipend of S$3,300 during the Ph.D. for four years<br>• Full tuition fees<br>• Other allowances including<br>(i) Computer<br>(ii) Thesis allowance<br>(iii) Book allowance<br>(iv) Conference allowance<br>• Opportunities for overseas attachment<br><br>Successful candidates will be given support for up to four years of academic pursuit, leading to a Ph.D. Award is renewable on an annual basis, subject to good progress. |

### 3.2.3 Other Administrative Information

To apply for an AGS Scholarship,

- Visit http://www.nus.edu.sg/ngs/AGS.html to register on both A*GA Application Portal and NUS Graduate Admission System
- Submit all supporting documents, together with a printed copy of the application form to:

NUS Graduate School for Integrative Sciences & Engineering (NGS)

Centre for Life Sciences (CeLS)
28 Medical Drive, #05-01
Singapore 117456

To apply for an NGS Scholarship,

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- Register online at https://inetapps.nus.edu.sg/gda/common/newlogin.aspx.
- You will receive an email containing your application number, if you enter your email address correctly.
- Using your application number, log in to the Graduate Admission System (Research Programme) at *https://inetapps.nus.edu.sg/rschappl/*, and complete your online application form.
- Submit all supporting documents, together with a printed copy of the application form to:
  NUS Graduate School for Integrative Sciences & Engineering (NGS)

  Centre for Life Sciences (CeLS)
  28 Medical Drive, #05-01<
  Singapore 117456

  Closing dates for scholarship application:

NGSS:

Aug intake: 15 November (of the previous year)/15 March (of the same year)

Jan intake: 15 May (of the previous year)

AGS:

Jan intake : 15 May (of the previous year)

Aug intake : 15 November (of the previous year)

(Note: * Students may be allowed to register and commence their research earlier if they obtain the A*STAR Graduate Scholarship.)

### Admission Interview

To assess their eligibility for the scholarships short-listed applicants are expected to attend at least one round of interview.

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# Faculty's Commitment

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NGS - The home of cutting-edge, cross-disciplinary Ph.D. research and graduate education.

The NUS Graduate School for Integrative Sciences and Engineering (NGS) was established in 2003 to promote integrative research –

Ph.D. research projects, and coursework programmes that transcend traditional disciplinary boundaries.

Our multi disciplinary environment affords exceptionally gifted, motivated students tremendous flexibility. If they choose to, students

can explore the possibility of dipping into fields of study and research entirely different from the disciplines they originate from.

Our students have access to a world class infrastructure, and receive supervision from distinguished academics from two or more

different fields of their choosing and interests, if their research needs require it. And, the curriculum is tailor made to each individual

student's needs and interests, and affords opportunities for integrative learning. Such a totality in research and education effectively

enhances their critical thinking skills, and help them to design their Ph.D. projects in interesting ways. NGS has tight links with the relevant Faculties/Schools at NUS, and the various research institutes of the Agency for Science, Technology

and Research (A*STAR). NGS has also built synergistic, complementary partnerships with a select number of world leading overseas

research institutes and knowledge organisations in the USA, the UK, Continental Europe, Japan, China and Australia. Thus, NGS is able to

offer gifted students the opportunity to engage in globally progressive research in superb research facilities both within Singapore and

further afield.

## NGS Philosophy

NGS recognises that raising and solving many of the most challenging problems in science, engineering, and related aspects of medicine, require integrative research approaches. Students are encouraged to transcend traditional discipline boundaries in their Ph.D. research projects to elevate progress to new levels. For example, the skills sets of computational scientists, mathematicians or physicists can be deployed to model complex biological systems, engineers can draw on their specialist knowledge to devise novel methods for wound-healing or drug delivery, and life scientists can apply their knowledge of cell structures and functions to the study of artificial membranes.

## NGS Mission

Our mission is to provide world-leading integrative graduate education and research in science, engineering, computing, and related aspects of medicine.

NGS is a talent programme with two thrusts:

- NGS offers top-quality students opportunities for inter-disciplinary research with eminent researchers, leading to breakthroughs at the intersection of disciplines.
- NGS provides a cross-disciplinary, broad-based graduate education which is tailored to individual needs and interests.

## NGS Vision

NGS aspires to be a leading graduate school, developing creative thinkers with excellent communication skills and strong ethics, who will go on to be leaders in their respective fields, and in society.

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# Key Contact Information

For up-to-date information, please visit the NGS website at: http://www.nus.edu.sg/ngs

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| Prof DING Jeak Ling | Deputy Executive Director | 62776 | dbsdjl |
| Assoc Prof TANG Bor Luen | Deputy Executive Director | 61040 | bchtbl |
| Prof FOX, Thomas | Adviser | 68770 | ngsfto |
| Prof Joxan JAFFAR | EXCO Member | 67346 | dscjj |
| Assoc Prof Kevin McGEE | EXCO Member | 61550 | cnmmk |
| Assoc Prof SOONG Tuck Wah | EXCO Member | 61938 | phsstw |
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| Ms CHUAN Irene | | | |

| | | | |
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| Christina | Management Assistant Officer | 66190 | ngscic |
| Student Matters | | | |
| AGS / NGSS / PGA / PGA-Chem-Sci | | | |
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| Ms SOH Susie | Assistant Manager | 62158 | ngsskws |
| Ms LI Lishi Vivien | Senior Executive | 65524 | ngsllv |
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| Students Academic Matters | | | |
| Mr TAN Boon Chye | Assistant Manager | 67709 | ngstbc |
| Publicity Matters | | | |
| Mr Ho Wei Min | Manager | 67531 | ngshwm |
| Ms CHUAN Irene Christina | Management Assistant Officer | 66190 | ngscic |
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| Ms Poon Angela | Principal Systems Analyst | 68622 | ngspym |
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