



Materials Science and Innovation  
(International Program)

# PhD Handbook 2020/21

**WALAILAK  
UNIVERSITY**



# Doctor of Philosophy (Materials Science and Innovation) International Program, 2020

## Philosophy and Expected Learning Outcomes of the Program

### 1. Philosophy of the Program:

To produce graduate students (Ph.D.) knowledgeable in Materials Science based on a firm understanding in chemistry and physics with high quality research output at the international level, having good research ethics and morality, and able to contribute new knowledge in Materials Science and a high level of innovation to society.

### 2. Expected Learning Outcomes of the Program:

Expected Learning Outcomes of our doctoral program are formulated according to the skills needed internationally for jobs in Materials Science and Innovation, feedback received from stakeholders and the past record of our three graduates' programs (Chemistry, Physics and Materials Science and Engineering) employment and the direction of the National Strategy (2018-2037): Upon completion of the doctoral program, graduates must be able to:

#### *Be a creative and critical thinker:*

1. Demonstrate broad and coherent knowledge of pertinent areas of materials science related to their field of interest.
2. Exhibit an in-depth understanding of the underlying principles and applications of the various instrumentation, techniques and/or software critical to their research projects.
3. Properly collect, analyse, assess, and evaluate the data gathered in their experiments to make logical, reasonable, and valid scientific arguments.

#### *Be an effective communicator:*

4. Effectively communicate the fundamental aspects of their field of interest as well as their research ideas and experimental results, both in oral and written form.

#### *Be a reflective life-long learner:*

5. Work efficiently in a highly dynamic, multi-cultural and interdisciplinary environment.
6. Acquire sufficient skills and competencies needed to embark on a professional career.

#### *Be a service-driven citizen:*

7. Always conduct themselves ethically and responsibly in the pursuit of their scientific and professional objectives.

## PhD in Materials Science and Innovation Program's Structure (European Model)

Courses	Type 1.1	Type 1.2
<b>1) Compulsory</b>	-	-
- Developed skill group	6*	6*
- Seminar group	3*	4*
<b>2) Selective</b>	-	-
<b>3) Thesis</b>	<b>60</b>	<b>90</b>
<b>Total</b>	<b>60</b>	<b>90</b>

\* Not counting credits but must have study grading as S.

Note: All students must attend seminar every term even though they might not register the seminar course for that term.



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## Placement plan

### Type 1.1 (total credits 60)

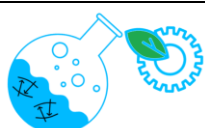
Year	Term 1		Term 2		Term 3	
1	MSI62-930 Thesis	6 credits	MSI62-930 Thesis	10 credits	MSI62-930 Thesis	8 credits
	MSI62-681 Seminar I*	1 credit	CHM60-682 Seminar II*	1 credit		
	MSI62-602 Innovation of Materials Technology*	2 credits	MSI62-600 Scientific writing I*	2 credits		
	<b>Total</b>	<b>6 credits</b>	<b>Total</b>	<b>10 credits</b>	<b>Total</b>	<b>8 credits</b>
2	MSI62-930 Thesis	8 credits	MSI62-930 Thesis	8 credits	MSI62-930 Thesis	8 credits
	MSI62-781 Seminar III*	1 credit			MSI62-601 Scientific writing II*	2 credits
	<b>Total</b>	<b>8 credits</b>	<b>Total</b>	<b>8 credits</b>	<b>Total</b>	<b>8 credits</b>
3	MSI62-930 Thesis	4 credits	MSI62-930 Thesis	4 credits	MSI62-930 Thesis	4 credits
	<b>Total</b>	<b>4 credits</b>	<b>Total</b>	<b>4 credits</b>	<b>Total</b>	<b>4 credits</b>

\* Not counting credits but must have study grading as S.

### Type 1.2 (total credits 90)

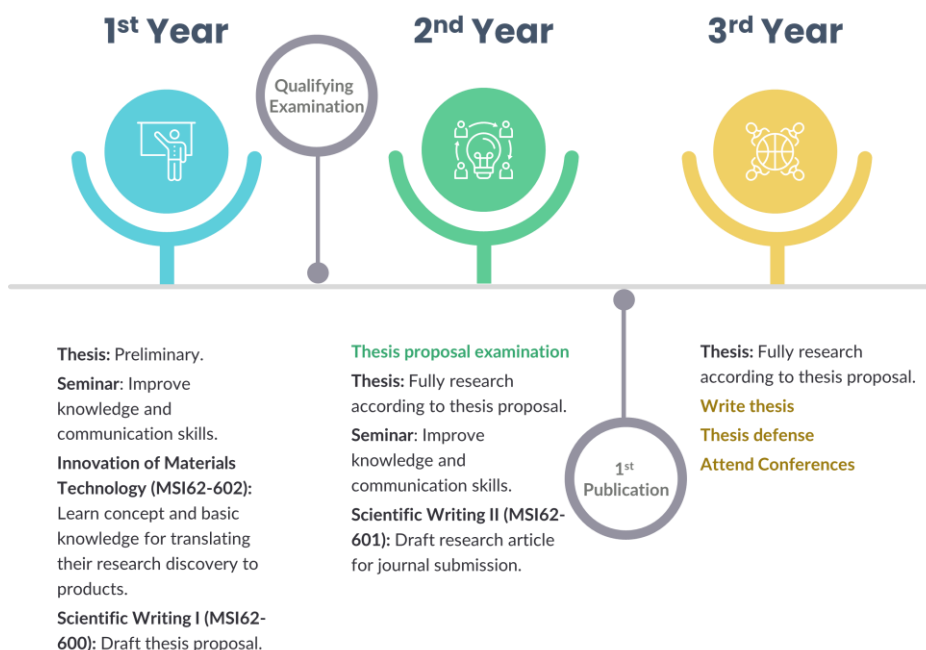
Year	Term 1		Term 2		Term 3	
1	MSI62-931 Thesis	6 credits	MSI62-931 Thesis	8 credits	MSI62-931 Thesis	10 credits
	MSI62-681 Seminar I*	1 credit	CHM60-682 Seminar II*	1 credit		
	MSI62-602 Innovation of Materials Technology*	2 credits	MSI62-600 Scientific writing I*	2 credits		
	<b>Total</b>	<b>6 credits</b>	<b>Total</b>	<b>8 credits</b>	<b>Total</b>	<b>10 credits</b>
2	MSI62-931 Thesis	10 credits	MSI62-931 Thesis	10 credits	MSI62-931 Thesis	10 credits
	MSI62-781 Seminar III*	1 credit	MSI62-781 Seminar IV*	1 credit	MSI62-601 Scientific writing II*	2 credits
	<b>Total</b>	<b>10 credits</b>	<b>Total</b>	<b>10 credits</b>	<b>Total</b>	<b>10 credits</b>
3	MSI62-931 Thesis	8 credits	MSI62-931 Thesis	8 credits	MSI62-931 Thesis	8 credits
	<b>Total</b>	<b>8 credits</b>	<b>Total</b>	<b>8 credits</b>	<b>Total</b>	<b>8 credits</b>
4	MSI62-931 Thesis	4 credits	MSI62-931 Thesis	4 credits	MSI62-931 Thesis	4 credits
	<b>Total</b>	<b>4 credits</b>	<b>Total</b>	<b>4 credits</b>	<b>Total</b>	<b>4 credits</b>

\* Not counting credits but must have study grading as S.



## Your study path toward Doctor

### Type 1.1



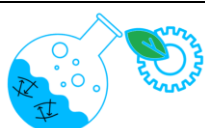
### Type 1.2



## List of important web site and personal

College of Graduate Studies  
Center for Educational Services  
Center for Library Resources and Educational Media  
Center for Digital Technology  
Center for Scientific and Technological Equipment

<https://grad.wu.ac.th/>  
[https://ces.wu.ac.th/webces/ces\\_eng.html](https://ces.wu.ac.th/webces/ces_eng.html)  
<http://clm.wu.ac.th/main/Index.aspx>  
<https://cdt.wu.ac.th/?lang=th>  
[https://cse.wu.ac.th/?page\\_id=2321&lang=en](https://cse.wu.ac.th/?page_id=2321&lang=en)



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M.Sc. and Ph.D. Program in Agro-Industry and Biotechnology  
M.Sc. and Ph.D. Program in Materials Science and Innovation  
Ph.D. Program in Health Science



**Supansa Kaewjaijong**



Role and Duty:

M.Sc. and Ph.D. Program in Agro-Industry and Biotechnology | M.Sc. and Ph.D. Program in Materials Science and Innovation | Ph.D. Program in Health Sciences



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College of graduate studies subcommittee meeting



Student development affairs



Research scholarships



Information technology system



GRAD-MS system



Online public relations



**Somruethai Bouyam, Ph.D.**



Role and Duty:

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College of graduate studies committee meeting



Admission



Graduation



Thesis



Scholarships



**Niramon Boonsang**



Role and Duty:

College of Graduate Studies Committee Meeting | Thesis | Admission | Scholarships | Graduation



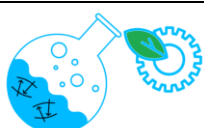
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### Progress Seminar Presentation Rubric

	5- Excellent	4 – Very good	3 – Good	2 - Poor	1 – Very poor
<b>Subject Matter</b>					
<b>1. Understanding:</b> did the student show an understanding of the material appropriate to a postgraduate chemistry student?	The student understood all the material.	The student understood most of the material, but the understanding of some points was superficial.	The student has reasonable understanding, but there were some errors.	The student showed understanding of many issues, but errors were frequent.	The student committed many errors, and demonstrated little understanding of the material.
<b>2. Context and Purpose:</b> did the student understand the purpose of the work and place it in its appropriate scientific context?	The student understood the aim of his/her research project and was able to provide a broader context.	The student understood the aim of the work but was unable to put it into a broader context.	The student <u>partially</u> understood the aim and context of the research project.	The student <u>partially</u> understood <u>only</u> the aim of the research project.	The student presented no aims or contextual information.
<b>3. Depth:</b> was the subject treated in detail and not superficially?	The student covered all the necessary topics in depth.	The student covered most topics, and all essential ones, in depth.	The student covered some topics in depth, but not all of the essential ones.	The student covered few topics in depth.	The student covered all topics only at a superficial level.
<b>Presentation</b>					
<b>4. Organization</b>	The presentation followed a logical sequence, and flowed smoothly from one section to the next.	The order of the presentation was logical, but the transitions were not all smooth.	The order of presentation was mostly good, but was awkward in one or two places.	The organization was awkward or jarring in several places.	The topics in the presentation were presented poorly, with no logical sequencing evident.



	5- Excellent	4 – Very good	3 – Good	2 - Poor	1 – Very poor
<b>5. Delivery</b>	The delivery was smooth, confident, well paced, and at the right volume.	There was some awkwardness in pacing or volume.	The delivery was poor enough to be noticeable but not poor enough to impair understanding.	Poor delivery impaired the clarity of the presentation.	The delivery prevented clear understanding of the presentation.
<b>6. Use of Visual Aids</b>	Visual aids were clearly laid out, appropriate in number, and easily legible. Figures and tables from outside sources were appropriately cited.	Most slides were good but some lacked clarity.	Slides were difficult to read and consistently had too much or too little information, but did not substantially impair understanding of the material.	Slides were sufficiently poor to make the material difficult to understand.	Slides showed little or no effort, poor organization, are unattractive, are inappropriate in number, and did not have the appropriate amount of information. Citations were lacking for figures and tables from outside sources.
<b>7. Clarity</b>	Everything was expressed very clearly.	All but the most difficult concepts were clearly explained.	Several points were not clearly explained.	Much of the presentation was difficult to understand.	The presentation was extremely difficult to understand.



## Thesis Research Rubric

	5- Excellent	4 – Very good	3 – Good	2 - Poor	1 – Very poor
<b>1. Research progress</b>	Significant progress has been made in the student's research	A lot of progress has been made in the student's research	Good progress has been made in the student's research	Some progress has been made in the student's research	Little or no progress has been made in the student's research
<b>2. Data management and analysis</b>	All data is carefully organized and appropriate analysis has been done	Data is carefully organized but not full analyzed	Data is either poorly organized <b>or</b> analysis is incomplete	Data is poorly organized <b>and</b> analysis is simplistic	Data is not organized and no analysis has been done
<b>3. Problem solving</b>	Able to identify and analyze problems and indicate possible solutions	Able to identify and analyze problems but cannot always give possible solutions	Able to identify and analyze problems but lacks clarity on possible solutions	Able to identify problems but struggles in analysis and solutions	Rarely identifies problems making analysis and problem solving impossible
<b>4. Critical and creative thinking</b>	Thinks clearly making evidence based deductions, and explores new ideas	Thinks clearly and deductively but struggles to create new ideas	Thinking sometimes confused with few deductions <b>or</b> ability to create new ideas	Struggles to think clearly and make deductions <b>and/or</b> create new ideas	Thinking often confused, rarely makes deductions <b>or</b> create new ideas
<b>5. Accountability and responsibility</b>	Remains focused on the task, is self-directed and follows through on assigned tasks	Mostly focuses on the task, lacks self-direction and may not always follow through on tasks	Needs reminding to focus and stay on task and often lacks self-direction	Often strays from the task and lacks self-direction	Rarely focuses on the task and demonstrates little or no self-direction
<b>6. Time management</b>	Routinely uses time well and completes projects on time	Uses time well but may procrastinate on part of the project	Tends to waste time but does complete the project on time	Often wastes time leaving several tasks incomplete by the deadline	Rarely completes tasks on time and needs deadlines adjusted





### Thesis Report Rubric

	5- Excellent	4 – Very good	3 – Good	2 - Poor	1 – Very poor
<b>1. Research background</b>	All of the relevant background is covered in detail	Most of the relevant background is covered in detail	There are gaps in the background	Only selected background is covered in detail	Little or no background is covered
<b>2. Experimental / Methodology</b>	The experiments and methodology are well designed and described	Most experiments and methodology are well designed and described	Parts are not well designed or described	Significant areas are poorly designed or described	There is no experimental design or methodology
<b>3. Results</b>	All results are clearly and concisely presented	All results are presented but some not clearly	Most results are presented, generally clearly	Significant numbers of results are poorly presented	Few, if any results are presented
<b>4. Discussion and analysis</b>	All results are discussed and analyzed in detail	All results are discussed but analysis is superficial	Most results are discussed and analysis is simplistic	Limited results are discussed and analyzed	No real discussion or analysis is present
<b>5. Presentation</b>	The report is neat, figures are clear, tables and text correctly formatted, and references consistent	The report is mostly well presented but figures, tables, text or references are untidy or incorrectly formatted	Parts of the report are not well presented or formatted	Significant areas of the report are poorly presented and formatted	Almost all of the report is poorly presented and formatted

**Total score 25 points** –Borderline scores can be given for example between good and very good would be awarded 3.5 points. All points from each section have equal weight and are additive.



## Comments

Borderline scores can be given for example between good and very good would be awarded 3.5 points.

1. **Points 1 and 2** in the **Thesis research rubric** relate directly to the research done by the student and is termed the **thesis research progress score**.
2. **Points 3-6** are **soft skills** that the student should acquire during the course of their studies and is called the **soft skills score**.
3. In determining the research progress and data management and analysis score due thought should be given to where the student is in their studies. For instance near the end of their studies a student would be expected to have finished practical work and will focus more on data analysis. The appropriate weightings for each program are:

**Table 1** PhD program Type 1.1 weighting (research only: 36 months program, 60 credits)

Term	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>	9 <sup>th</sup>
❶ Research progress	10%	10%	10%	15%	15%	15%	10%	10%	5%
❷ Data management and analysis	5%	5%	10%	10%	10%	15%	15%	15%	15%
❸ Soft skills	70%	75%	75%	80%	80%	85%	85%	90%	90%

**Table 2** PhD program Type 1.2 weighting (research only: 48 months program, 90 credits)

Term	1 <sup>st</sup>	2 <sup>nd</sup>	3 <sup>rd</sup>	4 <sup>th</sup>	5 <sup>th</sup>	6 <sup>th</sup>	7 <sup>th</sup>	8 <sup>th</sup>	9 <sup>th</sup>	10 <sup>th</sup>	11 <sup>th</sup>	12 <sup>th</sup>
❶ Research progress	5%	5%	10%	15%	15%	10%	10%	10%	10%	5%	5%	0%
❷ Data management and analysis	5%	5%	5%	5%	10%	10%	10%	10%	10%	10%	10%	10%
❸ Soft skills	65%	70%	75%	75%	80%	80%	85%	85%	85%	90%	90%	90%

Note: This year onward we indicated the soft skills into the thesis credit calculation.



4. The total score is calculated as follows:

- Points from the **Thesis report rubric** are added together and then divided by the total of 25 points. This represents **30%** of the thesis score.
- Points 1 and 2 in **Thesis research rubric** represent **50%** of the thesis score. The weighting of points 1 and 2 depends on their term.
- Points 3-6 in **Thesis research rubric** represent **10%** of the thesis score. If student reach the percentage of each term, student will have full score. However, if not will be proportion of their achievement.
- The **progress seminar** represents **10%** of the thesis score.

As an example, a PhD. student (Type 1.2) in term 7 achieving a score of 4 for points 1 and 2 in the **Thesis research rubric** would have the following score:

① Research progress = 4 points =  $\{(4/5)*10\% \} = 8\%$

② Data management and analysis = 4 points =  $\{(4/5)*10\% \} = 8\%$

Total = 8% + 8% = 16% out of a possible 20% (addition of 1) and 2) items in 7<sup>th</sup> term column in Table 2) =  $\{16/20\}*50 = 40\%$

And he/she is achieving a score of 3 for points 3-6 in the **Thesis research rubric** would have the following score:

③ Soft skills = 3 + 3 + 3 + 3 =  $\{(12/20)*100\% \} = 60\%$  which is below the expectation of 85% in his/her 7<sup>th</sup> term . Therefore, the score =  $(60/85)*10 = 7.06$

5. To calculate the total number of credits:

Total no. of credits awarded =  $\{[\text{Research score (50\%)} + \text{Soft skills (10\%)} + \text{Report score (30\%)} + \text{Progress seminar (10\%)}]/100\}*\text{no. of credit registered}$

- For example, 4 points from each section for the report plus 6/10 for the progress seminar gives. In this case the total score = 40 + 7.06 + 24 + 6 = 77.06%. According to Table 2, we need to calculate the credits awarded by following explanation:

Credits awarded =  $\{(40 + 7.06 + 24 + 6)/100\}*10 \text{ credits} = 7.7 \text{ credits} \rightarrow 8 \text{ credits}$ . **Numbers should be rounded up, unless there are significantly low scores in the soft skills section (points 3-6 in the Thesis research rubric). In this case the postgraduate committee can round scores down.**



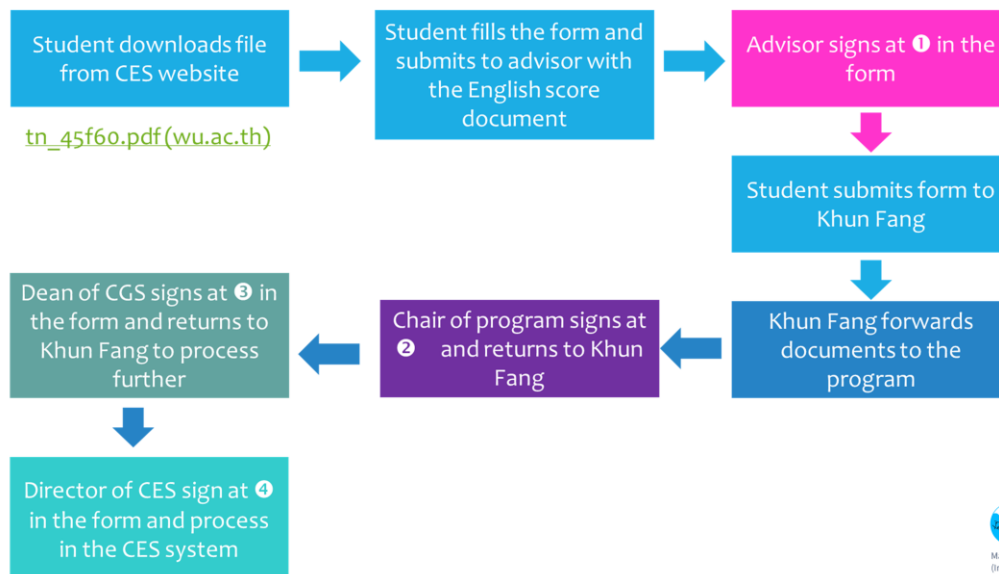
**Table 3** Guideline for credits awarded

Total score	Credits awarded
< 20%	0
20%-85%	Total no. of credits awarded = {[Research score (50%) + Soft skills (10%) + Report score (30%) + Progress seminar (10%)]/100}*no. of credit registered
> 85%	Full credits registered

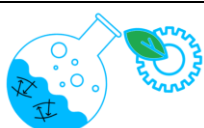
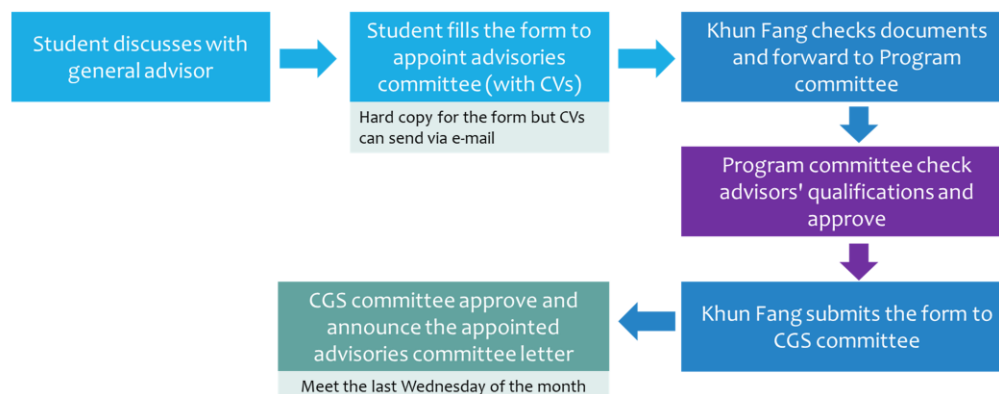


## Flow chart for all documents submission

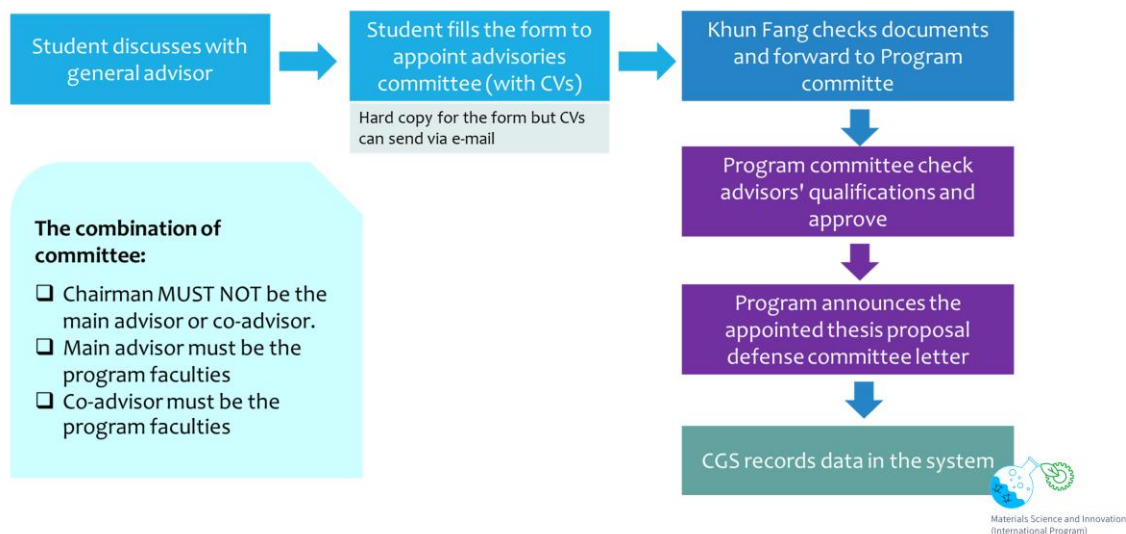
### English Proficiency Form Submission



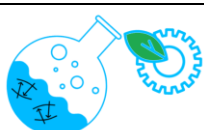
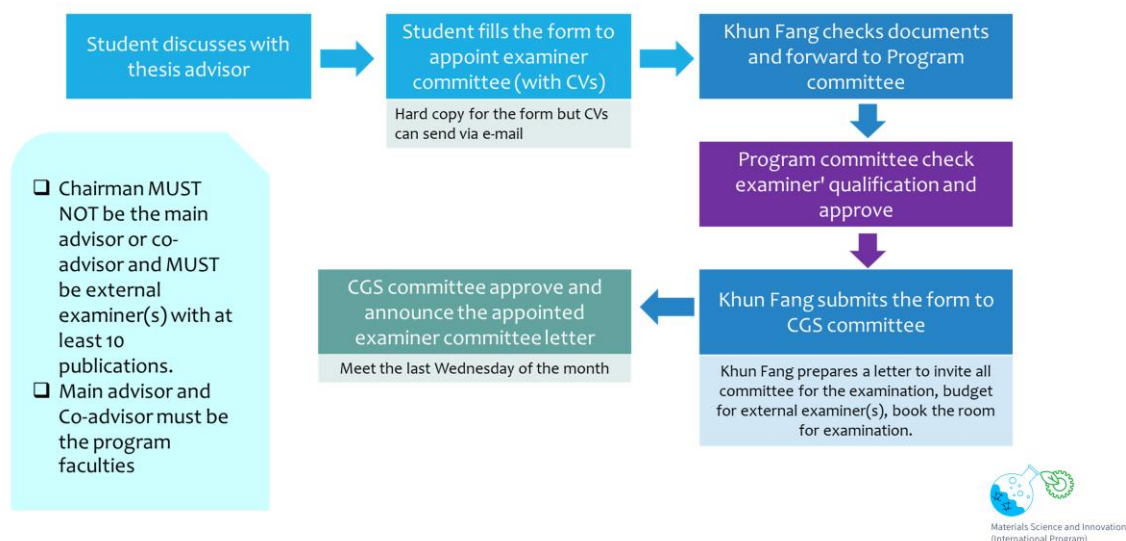
### Appointment for Advisories Committee



### Appointment for Thesis Proposal Defense Committee



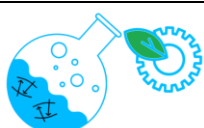
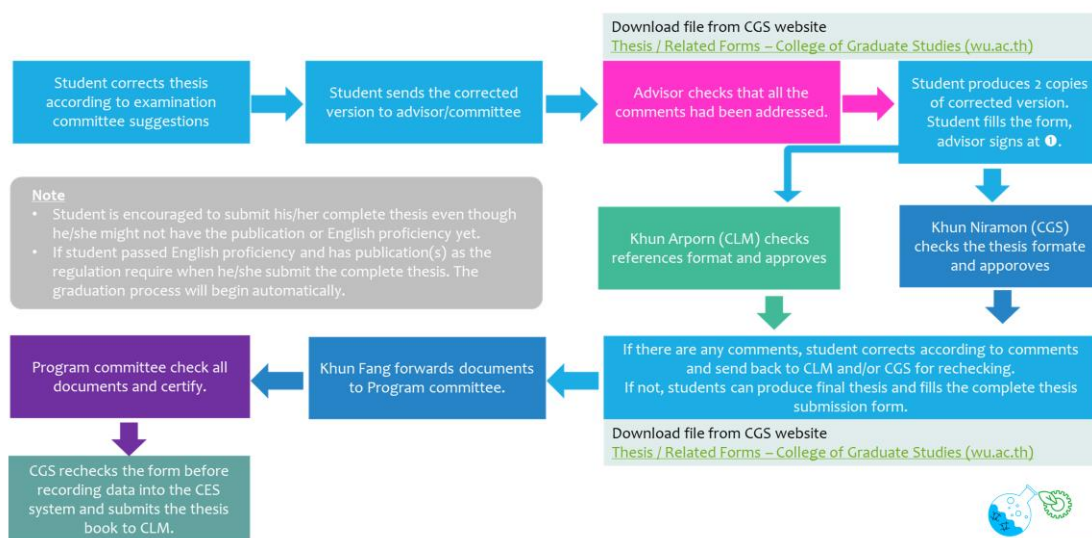
### Appointment for Thesis Defense Committee



### Thesis Examination Report



### Complete Thesis Submission



## Publication Submission & Graduation

In case student submitted the complete thesis before publication has been accepted/published.

