Nanyang Technological University
Division of Chemistry and Biological Chemistry

Academic Year	2020/2021	**Semester**	1
Course Coordinator	Director - CN Yang Scholars Programme Associate Chair (Academic) - SPMS		
Course Code	CM4111		
Course Title	Overseas Final Year Project		
Pre-requisites	None		
Mutually Exclusive	None		
No of AUs	12		
Contact Hours	Lab: 40 hours per week		
Proposal Date	25 Sep 2020		

Course Aims

Completing an 8-month research attachment in a reputable overseas university allows you to gain insights into the breadth and diversity of research work in an international environment, and build a global network. You will work with distinguished researchers in world-class laboratories, and develop an understanding of the processes involved in the design, development and implementation of a research project. You will learn to critically review scientific literature, systematically collect data, and logically analyze results in a specialized area of study. You will also develop and polish your oral and written communication skills. After going through the rigorous research process, you will be well-prepared for higher degree studies (Ph.D.).

Intended Learning Outcomes (ILO)

I. Cognitive

1. Apply knowledge and skills relevantly and appropriately in the research laboratory. [Apply fundamental chemistry knowledge, logical reasoning, chemical laboratory and/or computational skills to analyse and solve problems in a research project]
2. Identify your own competency gaps at the research laboratory.
3. Evaluate and develop personal learning and development pathways towards bridging competency gaps identified in point (2) above. [Identify technical skills needed to solve problems in a research project]
4. Develop and apply strategies to solve problems effectively (involves critical thinking and creativity, generating questions, resourcing, application and reiteration). [To formulate research question, methodically develop approaches to tackle problems using scientific approach, collect, analyse data to make rigorous and objective deductions.]
5. Evaluate resources and develop insights to make informed judgements and recommendations. [Exhibit awareness of relevant knowledge through literature review and critically evaluate sources of scientific/non-scientific information.]

II. Context

6. Discuss and Appraise significance, impact results and future plan of the research project
7. Reflect on the culture at the research laboratory.
8. Reflect on personal and professional development needs within the research laboratory and set strategic goals for advancing along an intended career path.
9. Apply time and task management strategies effectively. [Spend adequate time on the project to ensure rigour and quality]

III. Relationship

10. Apply effective written and oral communication skills in professional settings when communicating and connecting with research supervisor and colleagues. [Communicate (in writing and speaking) scientific and non-scientific ideas effectively to professional scientists and to the general public]

11. Assimilate into the work environment (people, team, hierarchy) and function effectively. [Communicate effectively with team members when working in a group and contribute as a valued team member when working in a group]

IV. Affective/Moral

12. Tolerate ambiguity and handle anxiety.
13. Contribute proactively to the research laboratory.
14. Demonstrate responsibility, integrity and professionalism in the fulfilment of all research requirements. [Readily pick up new skills, particularly technology related ones, to tackle new problems.]
15. Demonstrate the persistence to learn, overcome and improve.

V. Technical

16. Use tools that enable and facilitate effective project/work/assignment undertaken at the research laboratory.

VI. Graduate Attributes

Upon the successful completion of the Final Year Project program, you should be able to fulfil all the requirements of Graduate Attributes:

Competency	Graduates should be well-versed in the foundational and advanced concepts of chemical science, be able to evaluate chemistry-related information critically and independently, and be able to use complex reasoning to solve emergent chemical problems.
Creativity	Graduates should be able to synthesize and integrate multiple ideas across the curriculum, and propose innovative solutions to emergent chemistry-related problems based on their training in chemistry.
Communication	Graduates should be able to demonstrate clarity of thought, independent thinking, and sound scientific analysis and reasoning through written and oral reports to audiences with varying technical backgrounds. They should also be able to effectively engage other professional chemists in collaborative endeavours.
Character	Graduates should be able to act in responsible ways and uphold the high ethical standards that the society expects of professional chemists.
Civic-mindedness	Graduates should be aware of the impact of chemistry on society, and how chemistry can be applied to benefit mankind. They should also be aware of and uphold the best chemical safety practices

Course Content

You will experience independent supervised research work in a selected field of study. You

will be supervised by the faculty from the Overseas University. The specific content is

dependent on the selected field of study.

Assessment (includes both continuous and summative assessment)

Component	Course ILOs assessed	Related Graduate Attribute	Weighting	Individual/ Team	Assessment Rubrics
Performance	1-16	*Competency, Creativity, Communication, Character, Civic-mindedness*	28	Individual	See Annex 1 for rubric. Assessed by Overseas Supervisor.
Written Report	1-5, 10-11, 16	*Competency, Creativity, Communication, Character*	36	Individual	See Annex 2 for rubric. Assessed by CBC Faculty Examiners
Presentation	1-5, 10-11, 16	*Competency, Creativity, Communication, Character*	36	Individual	See Annex 3 for rubric Assessed by CBC Faculty Examiners
			100		

This is a Graded course with the final outcome determined collectively by your Overseas Supervisor and Faculty Examiners.

The assessments will be based on the intended learning outcomes (ILO) in section (B) above and you should familiarise yourself with them as they will be your focus throughout the Final Year Project programme.

Your Overseas Supervisor will assess your performance at the research laboratory and your written report through “Assessment of Work in the Research Laboratory” (AWRL) and “Assessment Rubrics for Written Report”, respectively. He/She will complete the evaluation at the end of your programme.

Your Faculty Examiners and Overseas Supervisor evaluate your learning and development through your written report and oral presentation, where will reflect on your experience, learning, growth and achievement of the relevant ILOs. Keep the ILOs in mind throughout your experience and undertake or seek challenges in the research laboratory that will provide you with opportunities to generate experience and evidences regarding your competencies.

	Overseas Supervisor	CBC Faculty Examiner 1	CBC Faculty Examiner 2	CBC Faculty Examiner 3	Total
Performance	28	-	-	-	28
Oral presentation	-	12	12	12	36
Written report	-	12	12	12	36
Total	28	24	24	24	100

Formative feedback

You will receive written or verbal feedback from your supervisor(s) from the Overseas University and assigned NTU faculty.

Learning and Teaching approach

You learn to be responsible, independent, self-disciplined and self-motivated. You become better at managing your time, resources and emotions in this independent supervised research work. You acquire critical and logical thinking skills, and creative problem solving skills. You gain confidence in your work and yourself, and develop fine oral and written communication skills. These skills would prepare you well for higher degree studies (Ph.D.).

Reading and References

Reading materials are dependent on the selected field of study and specific to each project. Supervising faculty will recommend reading materials, and you will conduct a comprehensive literature review as well.

Course Policies and Student Responsibilities

(1) General

You are expected to complete all assigned readings and activities, attend all lab sessions/research meetings punctually and take all scheduled assignments and tests by due dates. You are expected to take responsibility to follow up with course notes, assignments and course related announcements for research sessions they have missed. You are expected to participate in all research discussions and activities.

(2) Absenteeism

Absence from lab sessions/research meetings without a valid reason will affect your overall course grade. Valid reasons include falling sick supported by a medical certificate.

(3) Compulsory Assignments

You are required to submit compulsory assignments on due dates. The scores will be included in the course assessment.

Academic Integrity

Good academic work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of academic integrity and to the NTU Honour Code, a

set of values shared by the whole university community. Truth, Trust and Justice are at the core of NTU's shared values.

As a student, it is important that you recognize your responsibilities in understanding and applying the principles of academic integrity in all the work you do at NTU. Not knowing what is involved in maintaining academic integrity does not excuse academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of academic dishonesty, including plagiarism, academic fraud, collusion and cheating. If you are uncertain of the definitions of any of these terms, you should go to the Academic Integrity website for more information. Consult your instructor(s) if you need any clarification about the requirements of academic integrity in the course.

Course Instructors
None
Planned Weekly Schedule
The weekly schedule will be discussed and agreed on between students and their supervising faculty.

Annex A

Assessment Rubric for Overseas Final Year Project: Performance (Overseas Supervisor) (28%)

Criteria for the assessment of student performance in the research laboratory:

ILOs	Focus	Criteria
1.6	Knowledge and Skills [Scientific approach to problem solving]	Able to apply knowledge and skills (whether prior or newly learned) appropriately in the workplace and/or projects/tasks. [Able to put together analytical, laboratory and/or computational skills to solve quantitative problems.]
4	Problem-solving	Able to solve problems systematically and effectively.
5	Resourcefulness [Awareness of relevant knowledge, skills needed]	Able to source for relevant information to make informed judgement, decisions and/or recommendations. [Able to handle information critically and propose systematic approaches to handling problems.]
9	Time and Task Management	Able to plan, organise, manage and complete assignments effectively and in a timely manner.
10	Written and Oral Communication	Able to communicate effectively and appropriately in writing and verbally
11	Team Work	Able to function effectively with other colleagues/stakeholders in the work environment.
12	Adaptability	Able to function effectively under ambiguity and/or change.
13	Initiative	Able to remain consistently pro-active towards contributing to the work and/or organisation.
14	Responsibility	Consistently demonstrates commitment, responsibility, integrity, professionalism and ethical behaviour at the workplace.
15	Persistence to Learn and Improve [Particularly technological tools.]	Consistently demonstrates persistence and grit to overcome challenges, to learn and improve continuously at the workplace.
16	Fluency with Tools	Able to use tools, whether software or hardware tools, (and learn new ones where necessary) proficiently to accomplish tasks and assignments.

Annex B

Assessment Rubric for Overseas Final Year Project: Written Report (CBC Faculty) (36%)

Your written report in a professional setting will be assessed at the end of your final year project programme by CBC Faculty Examiners using the following criteria:

Category	Scoring Criteria
Organization	Content is organized and presented in a clear, coherent and logical sequence.
	Correct use of referencing throughout, formatted in the correct scientific specification.
	Proper literature review was done and references were properly cited.
	Appropriate use of figures, tables and graphs to communicate data and information.
Content	Clear description of project's objectives, motivations, interpretation and explanation of research approach, process and findings.
	Technical terms are well-defined in language appropriate for the subject area.
	Report contains accurate information.
	Material included is relevant to the overall message/purpose.
	Appropriate amount of material is prepared, and points made reflect well their relative importance.
	Shows clear understanding of key concepts/theories, and interpretation of wider context issues.
	Strong links made between problem statement, claims made, tools used and results.
	Discussion and conclusions tie well with the problem statement and results obtained.
Difficulty / Originality	Is the project a new initiative, or is it similar to a previous or ongoing project?
	Does the project involve very sophisticated theory or does it require heavy and challenging code development?
	Has the student developed original models or original results, novel and creative application of existing techniques/discovery of new principles?
	Clarity and distinct originality of thought, with clear link to major topics from research materials, as well as important linked topics.
Effort	The project involves substantial work and intellectual demand befitting of a university final year project.

Annex C

Assessment Rubric for Overseas Final Year Project: Oral Presentation (CBC Faculty) (36%)

Your **slideshow** presentation in a professional setting will be assessed at the end of your final year project programme by the CBC Faculty Examiners using the following criteria:

Category	Scoring Criteria
Organization	The presentation is appropriate for the topic and audience.
	Information is presented in a logical sequence.
	Presentation appropriately cites references used.
Content	Introduction is captures attention; the problem is well defined and establishes a framework for the rest of the presentation.
	Technical terms are well-defined in language appropriate for the target audience.
	Presentation contains accurate information.
	Material included is relevant to the overall message/purpose.
	Appropriate amount of material is prepared and points made reflect well their relative importance.
	There is an obvious conclusion summarizing the presentation.
Presentation	Speaker maintains good eye contact with the audience and is appropriately animated (e.g., gestures, moving around, etc.).
	Speaker uses a clear and audible voice.
	Delivery is poised, controlled, and smooth.
	Good language skills and pronunciation.
	Visual aids are well prepared, informative, effective, and not distracting.
	Length of presentation is within the assigned time limits.
	Content is presented in a clear and concise way.
Q & A	Able to answer questions in a way that reflects a good understanding of the project.