COURSE OUTLINE: MH4900

Course Title	**Final Year Project**
Course Code	**MH4900**
Offered	Study Year 4, Sem 1 | Study Year 4, Sem 2
Course Coordinator	Wang Li-Lian (Assoc Prof) | lilian@ntu.edu.sg | 6513 7465
Pre-requisites	None
AU	8
Contact hours	Lectures: 50
Approved for delivery from	AY 2019/20 semester 1
Last revised	8 Aug 2019, 12:07

Course Aims

This two-semester Final Year Project is offered as a Major Prescribed Elective course for all Single Major BSc in Mathematical Sciences programmes. It is offered as a Core for Double Major BSc (Hons) in Mathematical Sciences and Economics. For Double Major BSc (Hons) in Mathematical and Computer Sciences, students have the option to choose between MH4900 and CZ4079 as Core for their Final Year Project. This is an 8AU-course.

The purpose of this Final Year Project programme is to enable the application of knowledge and skills you have learned in the university in an authentic research environment. This is such that you can gain relevant exposures and develop research experiences and skills that will facilitate your career decision and future transition into your selected vocation. It allows you to develop research competencies that will enhance your employability and lifelong learning capabilities to support your career and life endeavours and your readiness for the future of work. The Final Year Project programme provides an opportunity to apply and integrate the knowledge you have gained through various subjects in your degree programme, and to demonstrate practical research skills through solving real life problems in related field.

Intended Learning Outcomes

Upon successfully completing this course, you should be able to:

Cognitive

1. Apply knowledge and skills relevantly and appropriately to solve problems in a research project.
2. Identify your own competency gaps in a research project
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). (E.g. develop methodology and plan to achieve project objectives, formulate appropriate research questions.)
5. Evaluate resources and develop insights to make informed judgements and recommendations. (E.g. conduct literature review on a research problem.)

Context

6. Discuss the background literature, problem statement and context of the problems in a research project.
7. Appraise the significance and impact of the project/results undertaken.

8. Reflect on personal and professional development needs within research project and set strategic goals for advancing along an intended direction of investigations.

9. Apply time and task management strategies effectively. [Spend adequate time on the project to ensure rigour and quality]

10. Apply effective written and oral communication skills in professional settings when communicating and connecting with relevant supervisors, faculty and examiners. Communicate (in writing and speaking) scientific and non-scientific ideas effectively in presentations and final report.

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

Affective/Moral

12. Tolerate ambiguity and handle anxiety.

13. Contribute proactively to the research project.

14. Demonstrate responsibility, integrity and professionalism in the fulfilment of all research requirements. [Readily pick up new skills to tackle new problems.]

15. Demonstrate the persistence to learn, overcome and improve.

Technical

16. Use tools that enable and facilitate effective project/work/assignment undertaken [This includes mathematical/software/computing tools for analysing and solving problems.]

Course Content

In this Final Year Project programme, you (as a student) will experience independent supervised research work in a selected field of study. You will be supervised by the faculty from the Division of Mathematical Sciences to achieve the intended learning outcomes listed above. The specific content is dependent on the selection field of study.

Assessment

Component	Course ILOs tested	SPMS-MAS Graduate Attributes tested	Weighting	Team / Individual	Assessment Rubrics
Continuous Assessment					
Lectures					
Continuous Assessment 1	2, 3, 8, 9, 10, 11, 12, 13, 14, 15	**3.** a, b **4.** a **5.** a	10	individual	See Appendix for rubric
Examination					
Final Oral Presentation 1	1, 4, 5, 6, 7, 10, 16	**1.** a, b, c, d **2.** a, b, c, d **3.** a **4.** a **5.** a	40	individual	See Appendix for rubric
Final Thesis Report	1, 4, 5, 6, 7, 10, 16	**1.** a, b, c, d **2.** a, b, c, d **3.** a **4.** a **5.** a	50	individual	See Appendix for rubric
			Total	**100%**	

These are the relevant SPMS-MAS Graduate Attributes.

1. Competence

  a. Independently process and interpret mathematical theories and methodologies, and apply them to solve problems

  b. Formulate mathematical statements precisely using rigorous mathematical language

  c. Discover patterns by abstraction from examples

  d. Use computer technology to solve problems, and to communicate mathematical ideas

2. Creativity

  a. Critically assess the applicability of mathematical tools in the workplace

  b. Build on the connection between subfields of mathematics to tackle new problems

  c. Develop new applications of existing techniques

  d. Critically analyse data from a multitude of sources

3. Communication

  a. Present mathematics ideas logically and coherently at the appropriate level for the intended audience

  b. Work in teams on complicated projects that require applications of mathematics, and communicate the results verbally and in written form

4. Civic-mindedness

  a. Develop and communicate mathematical ideas and concepts relevant in everyday life for the benefits of society

5. Character

  a. Act in socially responsible and ethical ways in line with the societal expectations of a mathematics professional, particularly in relation to analysis of data, computer security, numerical computations and algorithms

Formative Feedback

Continuous feedback on progress and performance can be expected from your supervisor.

Learning and Teaching Approach

Lectures (50 hours)	The Final Year Project programme is an experiential research programme done in a professional setting. You will be placed in a research project and will undertake reading and working on problems, where you learn to be responsible, independent, self-disciplined and self-motivated. You are expected to become better at managing your time, resources and emotions in this independent supervised research work. You would also acquire critical and logical thinking skills, and creative problem solving skills. You would gain confidence in your work and themselves, and develop fine oral and written communication skills. The MAS Faculty Supervisor will be the key person working with and interacting with you on a regular basis. You are expected to take the initiative to approach your supervisor for discussions and resolve issues when you encounter difficulties.

Reading and References

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

Course Policies and Student Responsibilities

The Final Year Project programme concerns research work in a professional setting. As with good academic work, good research work depends on honesty and ethical behaviour. The quality of your work as a student relies on adhering to the principles of research and 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. Refer to this link for details: http://www.ntu.edu.sg/ai/Pages/shared-values-honour-code.aspx

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As a student, it is important that you recognize your responsibilities in understanding and applying the principles of integrity in all the work you do as a student of NTU. Not knowing what is involved in maintaining integrity does not excuse professional and academic dishonesty. You need to actively equip yourself with strategies to avoid all forms of professional and academic dishonesty, including and not limited to, plagiarism, 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 faculty supervisor if you need any clarification about the requirements of professional and academic integrity in the course.

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

Instructor	Office Location	Phone	Email
Wang Li-Lian (Assoc Prof)	SPMS-MAS-05-20	6513 7465	lilian@ntu.edu.sg

Planned Schedule

Topic	Course ILO	Readings/Activities
Semester 1: Week 1 Student will choose the project to work on. The weekly schedule will be discussed and agreed on between students and project supervisor.	6, 10, 15	
Semester 1: Week 2-13 Student will experience independent supervised research work in a selected field of study. Student will be supervised by the faculty from the Division of Mathematical Sciences to achieve the intended learning outcomes listed above. The specific content is dependent on the selection field of study.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	
Semester 2: Week 1 Student will have to submit 5-7 page progress report to project supervisor. Submission will be followed by a short (approximately 20 min) oral presentation to the supervisor.)	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	
Semester 2: Week 2-11 Student will experience independent supervised research work in a selected field of study. Student will be supervised by the faculty from the Division of Mathematical Sciences to achieve the intended learning outcomes listed above. The specific content is dependent on the selection field of study.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	
Semester 2: Week 12-13 Student will have to submit thesis to the Division for pre-examination by FYP Committee.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	
Semester 2: Week 14 Student will present their Final Year Project to the project supervisor and examiner.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	
Semester 2: Week 15 Student will have to submit final thesis to the Division for assessment.	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16	

Appendix 1: Assessment Rubrics

Rubric for Lectures: Continuous Assessment 1 (10%)

Category	Scoring Criteria
Initiative and Motivation	Did the student appear motivated to complete the tasks assigned to him/her?
	Did the student proactively clarify doubts with his/her supervisor?)
Practical Ability and Creativity	Did the student complete his/her assigned tasks satisfactorily?
	Did the student expect supervisor input for simple problems?
Personal Discipline and Professionalism	Did the student have integrity and a good management scheme for the data and calculations done for the project?
	Is the student neat, responsible and focused to complete his/her work professionally?

Rubric for Examination: Final Oral Presentation 1 (40%)

Category	Scoring Criteria
Overall Organization	Did the student describe the background behind the project?
	Was information organized in a logical and systematic manner?
	Did the student lay out the problem well, and establish a framework for the rest of the presentation?
	Are technical terms well-defined in language appropriate for the target audience?
	Did the student concluded appropriately?
	Good time management?
Visual and Oral Presentation	Are the slides informative?
	Are the slides too cluttered or to sparse, well prepared and not distracting?
	Clear and audible voice?
	Speaker maintains good eye contact with the audience and is appropriately animated (e.g., gestures, moving around, etc.).
Q & A	Did the student understand the questions, and answer to the point?
	Was the student confident in his/her answer?

Rubric for Examination: Final Thesis Report (50%)

Category	Scoring Criteria
Organization	Materials are organized and presented in a clear, coherent and logical sequence. Sharp sense of beginning and end
	Correct use of referencing throughout, formatted in the correct scientific specification.
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 area.
	Material included is accurate and relevant to the overall message/purpose.
	Discussion and conclusions tie well with the problem statement and results obtained.
	Shows clear understanding of key concepts/theories.
	Strong links made between problem statement, claims made, tools used and results.
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?
	Did the report contain original models or original results, novel and creative application of existing techniques/discovery of new principles?