Subject Description Form

Subject Code	**BSE4725**
Subject Title	Capstone Research Project
Credit Value	6
Level	4
Pre-requisite	BSE3713 Research Methods in Building Services Engineering Any 4 of the below subjects BSE3123 Power Distribution BSE318 Lighting Technology BSE3225 HVACR I BSE3226 HVACR II BSE3312 Piped Services BSE3321 Fire Services
Co-requisite	Nil
Exclusion	Nil
Objectives	Research project is undertaken by students with the aim of developing the skills and abilities to undertake, independently, a major piece of investigation in a specialist subject area. The research is conducted over 2 consecutive semesters in the BEng (Hons) programme. Students will focus on Research Project planning and on Research Project Execution in 2 consecutive Semesters guided by an academic supervisor. The research work shall be related to and integrate with previous and current academic studies. It is intended to allow students to develop and practise research skills. The nature of work will be similar to the type of investigation sometimes required in professional practice. The tasks to be accomplished by the students in this subject include, but are not limited to below, Project Planning Focus a) based on the developed methodology, acquire the necessary skills and abilities for the execution of the project; b) make necessary arrangements for the research work (this may include equipment loan, site arrangement, laboratory set-up, computer software installation, etc.); and c) conduct preliminary investigations. Project Execution Focus d) conduct investigation and data collection in a critical and professional manner; e) demonstrate the ability to critically evaluate information and data; f) communicating clearly and concisely the progress and final outcome of the study; and g) demonstrate good management of time and resources available for the project.
Intended Learning Outcomes	Upon completion of the subject, students will be able to: a) practice application of theories in a specialist subject area; b) plan the supporting practical work (experimental, fieldwork, site investigations, laboratory studies, computer simulations, etc.) for investigation in a specialist subject area; c) independently develop the skills and abilities to undertake major investigative project work related to a specialist building sciences and engineering subject area; d) demonstrate an ability to carry out applied research in a critical manner, through adequate planning, development of an appropriate methodology and by selection of suitable equipment / computer software; e) demonstrate an ability to collect and critically evaluate data related to building sciences and engineering; f) communicate clearly and concisely the progress and outcome of the study; and

	g) demonstrate good time management for the project.
Subject Synopsis/ Indicative Syllabus	Students are required to confirm facts, reaffirm the results of previous work, solve new or existing problems, or develop new theories based on substantial literature review, concise methodology design and scientific investigations in the following areas. The research outcome will make practical applications. • Acoustic and noise control • Building automation • Built environment • Electrical engineering • Energy saving for buildings • Facilities engineering and management • Fire and safety • Indoor environmental quality • Refrigeration • Renewable energy • Ventilation and air-conditioning • Water supply and drainage
Teaching/Learning Methodology	*Project Planning* The student shall take account of available resources, site access, time, etc., when refining aims and objectives when determining a project plan. Students are expected to acquire the required abilities and skills for the project work. *Project Plan Refining* The student shall have taken account of available resources, site access, time, etc., when refining aims, objectives and project plan, where deemed necessary in the execution of the work. *Record of Meetings and Activities* A record of all activities is to be maintained by the student. It shall record time spent at meetings, on self-study, on site investigations, etc. The Group Coordinator shall check the record periodically. It should be brought to all meetings, updated regularly and submitted with the Project File. *Intermediate Presentation* At the end of 1st Semester, an intermediate presentation takes place before a group of academic staff. Each student is required to give a presentation on his or her works done and to answer questions in front of an assessment panel. Assessment by each member of the group is rationalised to a single score. *Project Execution* • Students must obtain the approval of their Group Coordinator before embarking on any site surveys or measurements. Relevant approval shall be obtained from governing bodies (e.g. human ethic, animal ethic, laboratory safety). The methodology must be clearly defined and resources identified. • Students must gain proper permission to enter sites for conducting surveys or measurements. Where the department initiates a project, the department will help arrange access. • Where equipment is to be transferred for use on site, an Equipment Loan Form must be completed. • Students must gain approval from the Department for survey questionnaires before they are

issued.

Project File

Each student maintains a file containing all relevant information and data for the project:

- Record of meetings and activities, feedback from supervising staff, correspondence etc.
- Interim review, project proposal, project paper and comments from assessors.
- Copies of major references used (except copyright material).
- Project notes, site and survey data, summary of equipment, software, etc.
- Any site/system/equipment drawings, catalogues, etc.
- Site/laboratory measurement data.
- Summary of hours spent in meetings with supervising staff and clients, self-study, practical work, etc.

Files on Disk

All text, graphics and data files relevant to the project are submitted with the Project File. This includes the Paper. These will be electronically submitted via Blackboard in the end of the 2nd Semester and/or format deemed appropriate.

Dissertation

At the end of the 2nd Semester, it is required to submit a dissertation. The dissertation should cover the complete research work and to be written in a style suitable for reading by research professionals. The content of the dissertation should include an abstract, an introduction, a literature review, the methods (survey/experiment/simulation), results/analysis and discussion, conclusions and any others deemed appropriate.

The introduction part should give the backgrounds and justification of the proposed investigations, supported with a literature review, and the aims and objectives of the project; the methods part shall present the methods used, such as site survey, laboratory experiments or computer simulation, and list the scopes of the work to be undertaken. The result part shall include findings and data analysis, such as a comparison with relevant standards, verification, application or rejection of a theory, model or guidance, identification of the cause of a problem, etc. In this part, table/graphs shall preferably be used. At the end of the report, conclusions should be given.

The format of the paper shall be:

- The body of the paper is a maximum of 40-60 pages A4. Single column text. Font size12 pt. Double-line spacing.
- The pages of text and diagrams /graphs can be mixed.
- Only references, which are clearly mentioned in the text, shall be listed. Full citation to be given.
- Figures, charts and tables, including all labels, to be clearly legible. Minimum font size 8 pt, e.g., Helvetica.
- Acknowledgements are to be included
- The paper shall include a disclaimer signed by the author declaring the originality of the work.
- The paper shall go through similarity check, e.g. by Turnitin, given a similarity index must not be more than 30%. The checking report shall be submitted together with the paper.

Final Presentation

At the end of the 2nd Semester, a final presentation takes place before a group of academic staff, and may include outsiders. Each student is allocated a presentation period for their findings and then followed with a question and answer session. Assessment by each member of the group is rationalised to a single score.

Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed (Please tick as appropriate)						
		a	b	c	d	e	f	g
Coursework	100	✓	✓	✓	✓	✓	✓	✓
Total	100							

Assessment Key

1st Semester

Sem. Week	Assessment Element	Assessors	Assessment Elements	Weighting
13	Intermediate Presentation	Group of staff	Supporting material, Organization, Delivery, Subject knowledge	20%
1-13	Project Development	Group Coordinator	Problem solving skills, Critical thinking, Initiative	10%

2nd Semester

Sem. Week	Assessment Element	Assessors	Elements	Weighting
13	Dissertation	Group of Staff	Solving research problem, Quantitative literacy, Analyzing data, Drawing conclusion, Grammar, spelling and presentation	40%
13	Presentation	Group of staff	Supporting material, Organization, Delivery, Subject knowledge	20%
1-13	Project Execution	Group Coordinator	Problem solving skills, Critical thinking, Initiative	10%

The marking scheme used by the assessors for various assessment elements are given in the assessment rubrics. The grades may be subject to overall review and rationalisation of grades between groups by the Research Project subject examiner.

The aggregate percentage will be converted to the appropriate subject grade.

Student Study Effort Expected		
	Class contact:	
	▪ Group /Individual meeting	52 Hrs.
	▪ Experiment/Site survey/ Simulation	26 Hrs.
	Other student study effort:	162 Hrs.
	Total student study effort	240 Hrs.

Reading List and References

JK Jesson, L Matheson, FM Lacey 2011. Doing your literature review: traditional and systematic techniques. LA, Calif.: SAGE.

K Williamson, G Johanson, 2017. Research Methods–2nd Ed. Information, Systems, and Contexts. Chandos Publishing: ELSEVIER.