Subject Description Form

<table>
<tr><td>Subject Code</td><td>ME569</td></tr>
<tr><td>Subject Title</td><td>Thermal System Design and Management</td></tr>
<tr><td>Credit Value</td><td>3</td></tr>
<tr><td>Level</td><td>5</td></tr>
<tr><td>Pre-requisite/
Co-requisite/
Exclusion</td><td>Students should have basic knowledge in Thermofluids.</td></tr>
<tr><td>Objectives</td><td>To provide students with knowledge of advanced thermal technology; and make students have the ability to solve practical problems in industry.</td></tr>
<tr><td>Intended Learning Outcomes</td><td>Upon completion of the subject, students will be able to:
a. possess state-of-the-art knowledge and skills in the area of heat transfer and thermal sciences, be able to apply their knowledge and skills in designing and developing products or engineering systems;
b. think critically and holistically in dealing with real thermal and energy problems, and generate practical solutions; and
c. have recognition of the need for, and an ability to engage in life-long learning.</td></tr>
<tr><td>Subject Synopsis/
Indicative Syllabus</td><td>Review of Heat Transfer: Steady and unsteady conduction; forced and natural convection, and radiation.
Heat Pipe: Theory of heat pipe; types of the heat pipe; heat pipe design and manufacturing; heat pipe applications.
Cooling of Electronic Equipment: Cooling load of electronic equipment; thermal environment; conduction cooling, convection cooling and liquid cooling.
Heating and Cooling of Buildings: Thermal comfort; design conditions for heating and cooling; heat gain from people; lights and appliances; solar heat gain; infiltration heat load and weatherizing.
Refrigeration and Freezing of Foods: Control of microorganisms in foods; thermal properties of foods; refrigeration of fruits, vegetables and cut flowers; refrigeration of meats, poultry and fish; refrigeration of eggs, milk and bakery products; refrigeration load of cold storage rooms; transportation of refrigerated foods.
Solar Energy: Solar irradiation, solar energy conversion, solar energy collector.</td></tr>
<tr><td>Teaching/Learning Methodology</td><td>1. The teaching and learning methods include lectures/tutorial sessions, homework assignments, test, case study report and examination.
2. The continuous assessment and examination are aimed at providing students with integrated knowledge required for thermal system design and management.
3. Technical/practical examples and problems are raised and discussed in class/tutorial sessions.

<table>
<tr><td rowspan="2">Teaching/Learning Methodology</td><td colspan="3">Intended subject learning outcomes</td></tr>
<tr><td>a</td><td>b</td><td>c</td></tr>
<tr><td>1. Lecture</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>2. Tutorial</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>3. Homework assignment</td><td>√</td><td>√</td><td>√</td></tr>
<tr><td>4. Case study report and Presentation</td><td>√</td><td>√</td><td>√</td></tr>
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Assessment Methods in Alignment with Intended Learning Outcomes

Specific assessment methods/tasks	% weighting	Intended subject learning outcomes to be assessed		
		a	b	c
1. Homework assignment	20%	√	√	√
2. Test	20%	√	√	
3. Case study report and presentation	20%	√	√	√
4. Examination	40%	√	√	√
Total	100%			

Explanation of the appropriateness of the assessment methods in assessing the intended learning outcomes:

Overall Assessment:

$0.40 \times$ End of Subject Examination + $0.60 \times$ Continuous Assessment

The continuous assessment consists of three components: homework assignments, test, and case study report & presentation. They are aimed at evaluating the progress of students study, assisting them in self-monitoring of fulfilling the respective subject learning outcomes, and enhancing the integration of the knowledge learnt.

The examination is used to assess the knowledge acquired by the students for understanding and analyzing the problems critically and independently; as well as to determine the degree of achieving the subject learning outcomes.

Student Study Effort Expected

Class contact:	
▪ Lecture	24 Hrs.
▪ Tutorial/Case study	15 Hrs.
Other student study effort:	
▪ Self Study	45 Hrs.
▪ Case study report preparation and presentation	21 Hrs.
Total student study effort	105 Hrs.

Reading List and References

1. Cengel Y. A., *Heat Transfer*, McGraw-Hill, latest edition.
2. Rohsenow W. M., Hartnett J. P. and Ganić E. N., *Handbook of Heat Transfer Applications*, New York: McGraw-Hill, latest edition.
3. Incropera F. P. and DeWitt D. P., *Fundamentals of Heat and Mass Transfer*, John Wiley & Sons, Inc. latest edition.