What is Engineering?
What is Engineering?

Engineering combines the fields of science and math to solve real world problems that improve the world around us.

What really distinguishes an engineer is his ability to implement ideas in a cost effective and practical approach. This ability to take a thought, or abstract idea, and translate it into reality is what separates an engineer from other fields of science and mathematics.

http://whatisengineering.com/
# Engineering science project vs Science research project

<table>
<thead>
<tr>
<th>Investigative Science Research</th>
<th>Engineering Science Project</th>
</tr>
</thead>
<tbody>
<tr>
<td>State your question</td>
<td>Define your problem</td>
</tr>
<tr>
<td>Do background research</td>
<td>Do background research</td>
</tr>
<tr>
<td>Formulate your hypothesis, identify variables</td>
<td>Establish solution design criteria</td>
</tr>
<tr>
<td>Design experimental procedures</td>
<td>Propose solution design</td>
</tr>
<tr>
<td>Test your hypothesis</td>
<td>Testing of solution design</td>
</tr>
<tr>
<td>Analyze your results &amp; draw conclusions</td>
<td>Analyze of solution design &amp; redesign</td>
</tr>
<tr>
<td>Present results</td>
<td>Present results</td>
</tr>
</tbody>
</table>
Cat 12 Engineering Science

• Problem solving project

• Real world problem

• Applying knowledge of Math and Science
Requirements

• Oral Presentation of project’s details and progress during proposal, mid-term and final evaluation stages

• Video presentation on learning points for the Engineering Science project.

• Group Web report

• Individual performance
Presentation

- **Proposal Evaluation (5% or 10%)**
  - Project details (max 30 marks)
- **Mid-term Evaluation (35%)**
  - Project details (max 60 marks)
  - Oral presentation (max 15 marks)
- **Final Evaluation (20%)**
  - Project details (max 70 marks)
  - Oral presentation (max 15 marks)
  - Video presentation (max 15 marks)
  - *in the form of a skit*
Presentation Rubrics

• Proposal Evaluation -- 12/4/15 (Tue)
  – Problem identification and definition
  – Information gathering on problem and current situation
  – Identification and definition of solution design

• Presentation time : 5 mins
  Q&A : 3 mins
  Venue : LT2
Define the Problem

• What is the problem or need?

• Who has the problem or need?

• Why is it important to solve this problem?
Do Background Research

• What do we know about the problem?

• What is/are some existing solution(s) to problem or similar problem?

• What are the limitations of the present solution(s)?
Do Background Research

• Sources of information for literature review
  * Journals (published & online)
  * Books
  * Internet
Do Background Research

Sources of information for literature review

• Online Journals
  * Elsevier – open access journals
    http://www.elsevier.com/about/open-access/open-access-journals
  * ScienceDirect – open access journals
    http://www.sciencedirect.com/science/browse/all/open-access
  * Open access journals
    http://www.doaj.org/

• Published Journals

• Books

• Internet
  * Google®
    http://www.google.com.sg
    http://scholar.google.com.sg
Do Background Research

• References sources are credible, relevant and current (published within the last 5-10 years).
• Integrates information from relevant disciplines to provide a comprehensive background to project.
• Provides an informed opinion on the merits and/or inadequacies of current solutions
• Relates information to current project.
• Develops a rationale for undertaking current project.
• In-text citations has to be done where appropriate.
• Adequate references (print or non-print) from credible sources are acknowledged, cited in APA format.
Establish solution design criteria

• What are some design requirements for proposed solutions?
• Are these requirements feasible, important and relevant?
Propose solution design

• What are some possible solution designs to the problem based on the solution design criteria?

• How do we evaluate the possible solution designs?

• Which solution design would we working on for this problem?
Presentation Rubrics

• Mid-term Evaluation -- 8/7/15 (Fri)
  – Problem identification and definition
  – Information gathering on problem and current situation
  – Identification and definition of solution design
  – Application of specific content knowledge in solution design
  – Testing/ Implementation of solution design
  – Analysis of the solution design based on testing/ implementation process

• Presentation time : 7mins
  Q&A : 3 mins
Propose solution design

• What are the scientific principles behind these solution design?
Testing of solution design

• How are we going to test solution design?

• How could we evaluate the effectiveness of proposed solution design?
Analyze of solution design & redesign

• What information do the data collected tell us about the effectiveness of the solution design?

• What are some strengths and limitations of the solution design?

• What are some improvements that could be made to the solution design to improve its effectiveness?
Presentation Rubrics

• Final Evaluation -- 19/8/15 (Fri)
  – Problem identification and definition
  – Information gathering on problem and current situation
  – Identification and definition of solution design
  – Application of specific content knowledge in solution design
  – Testing/ Implementation of solution design
  – Analysis of the solution design based on testing/ implementation process
  – Implications and recommendation

• Presentation time : 10 mins
  Q&A : 3 mins
Implications and recommendation

• What are the implications and recommendation for proceeding with the solution design to the problem stated?

• How do your findings in this research support the proposed solution as a solution to the stated problem?

• What are some specific actions that need to be taken in order for the proposed solution to be implemented to solve the stated problem.
Video Presentation

- Focus on learning points for Engineering Science project
- Compulsory for all groups in the finals
- Deadline for submission (12 Aug)
- 5 – 8 mins in duration
- Rubrics
  - Content
  - Organisation
  - Creativity & Elements of Design
- Training dates
  - 22 Apr (Video capturing :- Ortus Room)
  - 13 May (Video editing:- Computer Lab 2)
Other requirements for IS

Assess by your own mentor

• **Group Web reports (IS 20%)**
  – Compulsory for all teams
  – Take note of [guidelines for Web report](#)
  – Build your web report as you progress in the project
  – Submit after final evaluation

• **Individual performance (IS 15%)**
  – For all students
Expectations

• Work closely with your mentor

• Be committed to your project

• Be personally and socially responsible

• Be respectful to your peers, your mentor and especially your external mentor
Enjoy your **learning** journey for your Engineering Science project!