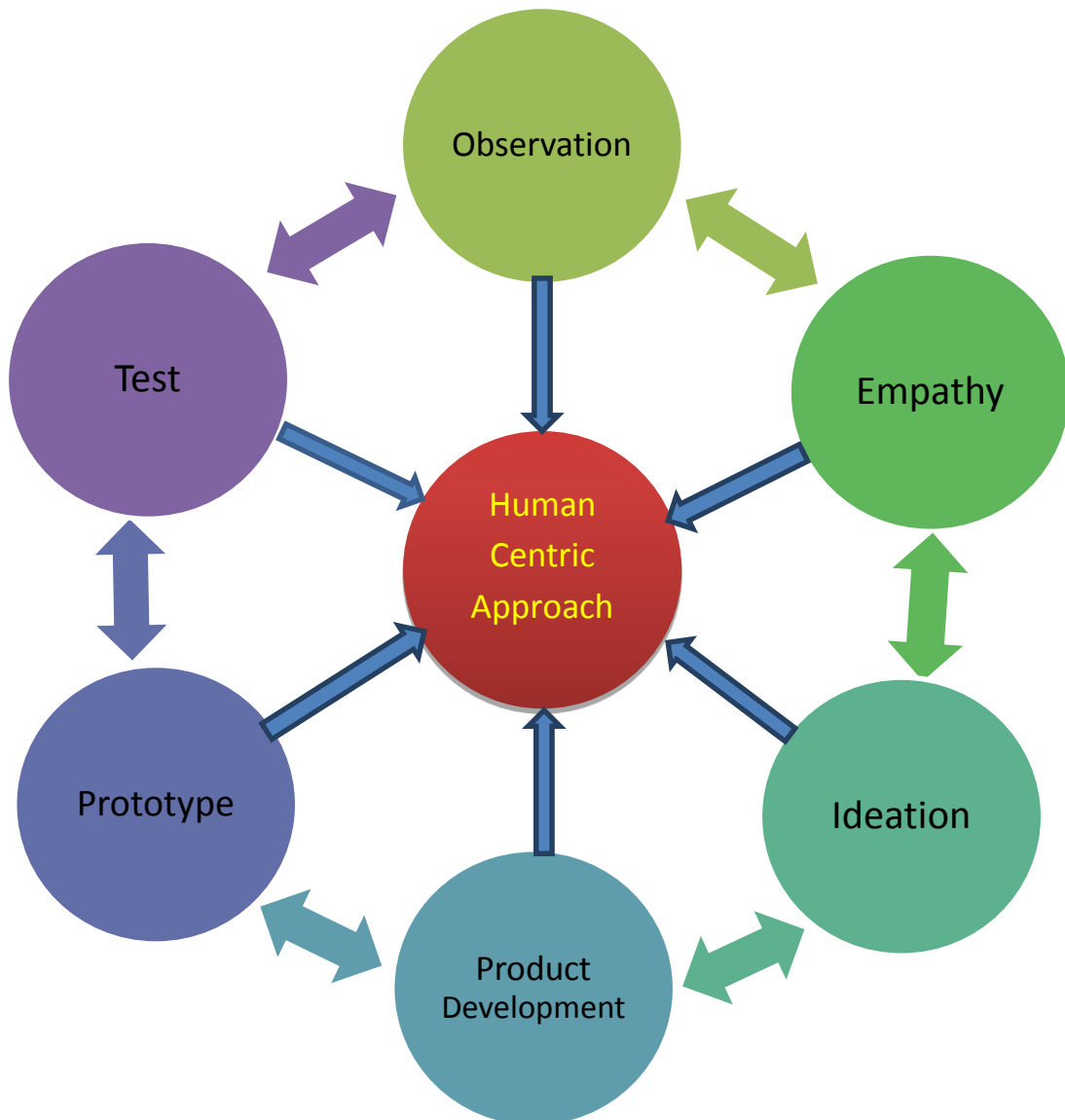


## Design Engineering – 1 (a)

### General Guidelines \_3<sup>rd</sup> Semester

All students of 3<sup>rd</sup> semester shall use the following guidelines for Design Engineering 1(a).

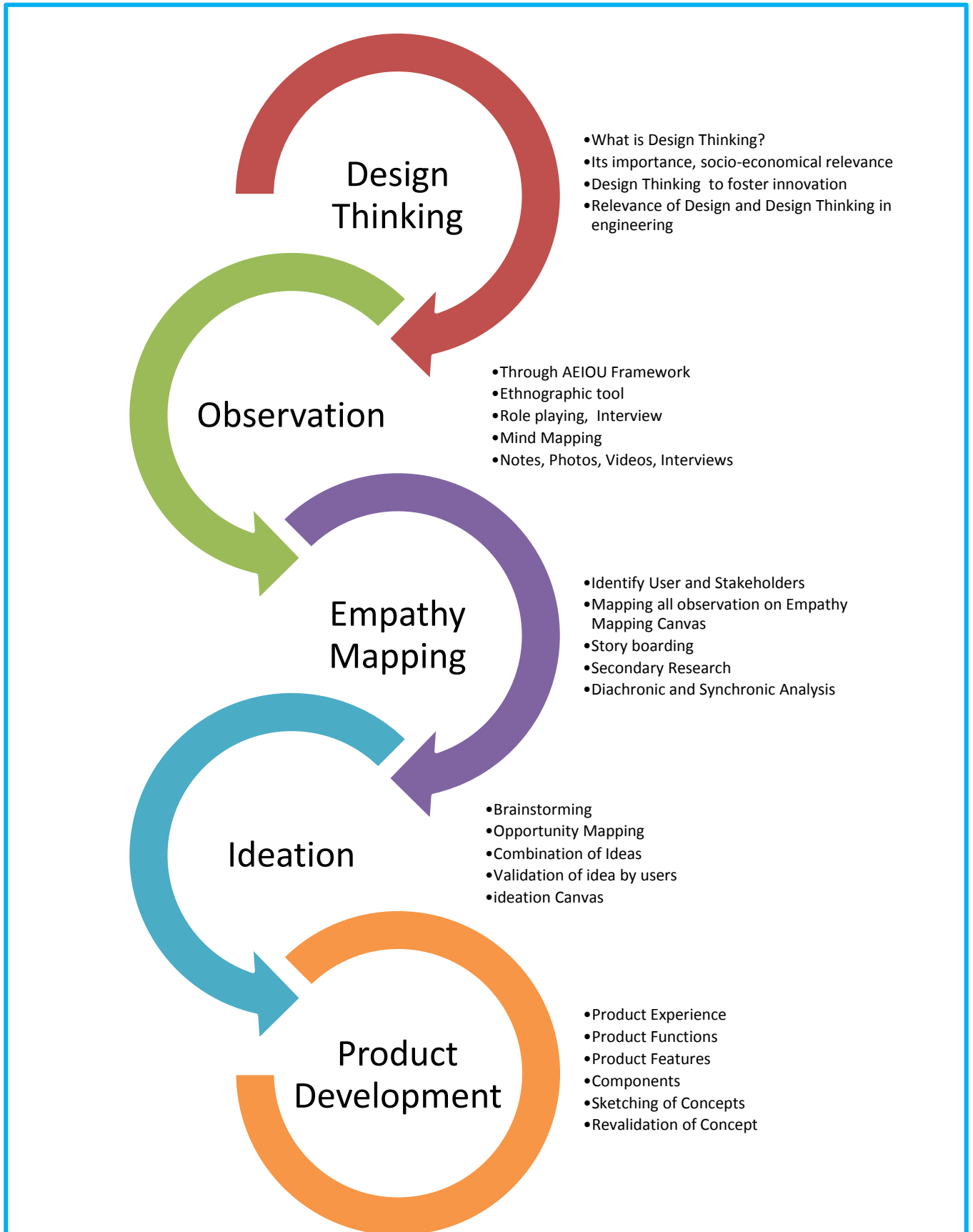
Design Engineering is based on globally accepted Design Thinking methodology. Design thinking phases may be divided into six simple yet iterative steps shown below:



# Design Engineering – 1 (a)

## General Guidelines \_3<sup>rd</sup> Semester

### Steps to follow in 3<sup>rd</sup> semester:



## Design Engineering – 1 (a)

### General Guidelines \_3<sup>rd</sup> Semester

Broad segment	Week	Description	Operational need
Design Thinking Introduction	1	<ul style="list-style-type: none"> <li>○ Overview, objective and goal of this course</li> <li>○ What is Design Thinking?</li> <li>○ Its importance, socio-economical relevance</li> <li>○ Design Thinking to foster innovation</li> <li>○ Relevance of Design and Design Thinking in engineering</li> <li>○ Systematic problem identification process</li> <li>○ Systematic problem solving approaches</li> </ul>	<ul style="list-style-type: none"> <li>○ Brief lecture/exercise</li> <li>○ Hands on exercise to understand attributes of Design Thinking</li> </ul>
	2	<ul style="list-style-type: none"> <li>○ Learning tools                             <ul style="list-style-type: none"> <li>✓ Design in Nature/Bio-mimicry</li> <li>✓ Design as a System approach</li> <li>✓ Design as listening tool for Mapping users' Unarticulated needs</li> <li>✓ Learning by Analogy, Artefactual, Heuristic and Gestalt Model</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>○ Brief lecture/exercise</li> <li>○ Next week students will make presentation on these topics</li> </ul>
	3	<ul style="list-style-type: none"> <li>○ Team Building, Domain Selection (Society/Industry project)</li> <li>○ Log book, Documentation Strategy – Introduction, Importance, Preparation</li> </ul>	<ul style="list-style-type: none"> <li>○ Brief lecture/exercise</li> <li>○ Hands-on practice sessions with cases /examples</li> </ul>
Empathization Phase	4,5,6	<ul style="list-style-type: none"> <li>○ Observation: Through AEIOU Framework                             <ul style="list-style-type: none"> <li>✓ Orientation to Field Work – Need for field visit. What/How/Where to observe</li> <li>✓ Ethnographic tools and its usage</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>○ Students will be introduced to different observation/scouting methods in the theory session in class for all the four weeks</li> </ul>

## Design Engineering – 1 (a)

### General Guidelines \_3<sup>rd</sup> Semester

		<ul style="list-style-type: none"> <li>✓ What difference it will make if the problem solved - partially or fully?</li> <li>✓ Could solution be worse than the problem?</li> <li>✓ Key pain and pleasure points</li> <li>✓ Understanding of user contexts</li> <li>✓ Log book exercise</li> <li>✓ Analysis of Data - Mind Mapping tool</li> </ul>	<ul style="list-style-type: none"> <li>○ Then during the week, students will visit their domain/place of work for getting insights and define problems. 2-3 field trips will be required to get better insights on users' needs.</li> </ul>
	<ul style="list-style-type: none"> <li>○ Immerse:               <ul style="list-style-type: none"> <li>✓ Role playing</li> </ul> </li> </ul>		
	<ul style="list-style-type: none"> <li>○ Interview:               <ul style="list-style-type: none"> <li>✓ Formal and Informal Interview</li> <li>✓ Students may use Stanford Method given in below link -</li> </ul> </li> </ul> <p><a href="http://dschool.stanford.edu/wp-content/uploads/2013/10/METHODCARDS-v3-slim.pdf">http://dschool.stanford.edu/wp-content/uploads/2013/10/METHODCARDS-v3-slim.pdf</a></p>		
		<ul style="list-style-type: none"> <li>○ Summary of AEIOU activity/inputs</li> <li>○ Preparation of Empathy Mapping</li> </ul>	<ul style="list-style-type: none"> <li>○ Class as well as homework/field activity</li> </ul>
Problem Definition by Secondary Research ,Group work and Presentation	7	<ul style="list-style-type: none"> <li>○ Secondary Research/Prior Art Search</li> <li>○ Diachronic and Synchronic Analysis</li> <li>○ Group wise presentation followed by discussion</li> <li>○ Verification of problem identified by team through users/stakeholders</li> </ul>	<ul style="list-style-type: none"> <li>○ After rigorous and systematic field exercises, empathization and Secondary Research activities -student teams need to define their problem for further validation through Ideation phase.</li> </ul>

## Design Engineering – 1 (a)

### General Guidelines \_3<sup>rd</sup> Semester

Ideation Phase	8	<ul style="list-style-type: none"> <li>○ Preparation of Ideation Canvas               <ul style="list-style-type: none"> <li>✓ Brainstorming (What, Why, How, When, for Whom)</li> <li>✓ Situation/Context/Location</li> <li>✓ Props/Non-living things/Tools/Equipment</li> <li>✓ Opportunity Mapping</li> </ul> </li> </ul>	<ul style="list-style-type: none"> <li>○ 2 hour – explanation of Ideation Canvas to class</li> <li>○ Then students will work on their Ideation Canvas (min 3 hours continuous exercise)</li> </ul>
	9	<ul style="list-style-type: none"> <li>○ Combination of Ideas from Opportunity Mapping</li> </ul>	<ul style="list-style-type: none"> <li>○ Students’ teams will discuss their combination of ideas from Ideation Canvas with other teams, faculty guides and users and take feedback.</li> </ul>
	10	<ul style="list-style-type: none"> <li>○ Prioritizing and finalizing Idea/Concept</li> </ul>	<ul style="list-style-type: none"> <li>○ After Group Discussion and consulting with faculty guide ,students’ teams will select their final problem/idea/concept for further development</li> <li>○ Students’ team will validate the final idea/concept with users/stakeholders</li> </ul>
Product Development Phase	11	<ul style="list-style-type: none"> <li>○ Preparation of Product Development Canvas (PDC)               <ul style="list-style-type: none"> <li>✓ Product Experience</li> <li>✓ Product Functions</li> <li>✓ Product Features</li> <li>✓ Components</li> </ul> </li> <li>○ Sketching of Mock Concepts in Log book</li> </ul>	<ul style="list-style-type: none"> <li>○ 1.5 hour – explanation of Product Development Canvas to class</li> <li>○ Then students will work on their PD Canvas (min 3 hour continuous exercise)</li> </ul>

## Design Engineering – 1 (a)

### General Guidelines \_3<sup>rd</sup> Semester

	12	<ul style="list-style-type: none"><li>○ Discussion on Product Development Canvas (PDC)</li></ul>	<ul style="list-style-type: none"><li>○ In this week, students' team will discuss on their PDC with other groups and faculty guide</li><li>○ Refinement of PDC after discussion</li></ul>
	13	<ul style="list-style-type: none"><li>○ Customer/User Revalidation</li></ul>	<ul style="list-style-type: none"><li>○ Till the 14<sup>th</sup> week of the course, student team will consult the Users/Stakeholders for their inputs for concept finalization after various stages and incorporate necessary changes.</li></ul>
	14	<ul style="list-style-type: none"><li>○ Reject/Redesign/Retain</li></ul>	<ul style="list-style-type: none"><li>○ As per the feedback received from users/stakeholders, students' teams need to modify their design and further action plan. In case the whole thing needs to be relooked it has to be iterated with new prospective.</li></ul>

**Note:** For preparation of Empathy Mapping, Ideation and Product Development Canvas and its related case study, students may refer:  
[http://gtu.ac.in/circulars/15Apr/04042015\\_Designmaual\\_2.pdf](http://gtu.ac.in/circulars/15Apr/04042015_Designmaual_2.pdf)