

About Innovation and Design Thinking at BNM Institute of Technology (BNMIT)

Innovation and Design Thinking at BNM Institute of Technology (BNMIT), Bengaluru, is envisioned as a student-centric approach to developing creativity, problem-solving ability, empathy and an entrepreneurial mindset. Rather than viewing engineering education only through the lens of technical knowledge, Design Thinking encourages students to understand real-world problems, identify user needs, generate creative solutions, build prototypes and continuously improve them through feedback.

BNMIT has integrated Innovation and Design Thinking as a foundation course for first-year engineering students. The course is designed to introduce students to the fundamentals of innovation, design thinking and their application to product and service development. The curriculum emphasizes empathy, problem definition, ideation, prototyping and implementation through workshops, case studies, group activities and real-world interactions.

The approach complements BNMIT's broader innovation and entrepreneurship ecosystem comprising the Institution's Innovation Council (IIC), Innovations & ED Cell, Innovative Project Lab, Centre of Excellence initiatives and entrepreneurship programmes. BNMIT's IIC framework focuses on ideation, problem solving, proof-of-concept development, Design Thinking, intellectual property and pre-incubation/incubation activities.

Design Thinking as a Foundation for Innovation

Design Thinking provides a structured methodology for transforming an identified problem into a meaningful solution. At BNMIT, students are introduced to the process through experiential and collaborative learning rather than only theoretical instruction.

The major stages include:

Empathize → Define → Ideate → Prototype → Test → Implement/Iterate

Empathize

The first step is to understand the user, context and actual problem. Students learn techniques such as empathy mapping, journey mapping, observation, storytelling and interaction with users. The objective is to move beyond assumptions and understand what users actually experience.

Define

Students analyse the information collected during the empathy stage and synthesize it into a clearly defined problem. They learn to identify user insights, formulate problem statements and use “How Might We?” questions to convert challenges into opportunities for innovation.

Ideate

At this stage, students generate multiple possible solutions rather than immediately selecting the first idea. Brainstorming, mind mapping, SCAMPER, creative thinking and analytical thinking are used to encourage divergent and convergent thinking. Group-based ideation enables students from different disciplines to contribute different perspectives.

Prototype

Ideas are converted into tangible representations. Depending on the problem, students may develop low-fidelity models, high-fidelity prototypes, digital mock-ups, hardware models, software interfaces or minimum viable products (MVPs). Rapid prototyping allows students to identify weaknesses early and improve their solutions.

Test and Iterate

The prototype is evaluated using user feedback and real-world scenarios. Students learn that failure is part of innovation and that a successful solution often emerges through several iterations. This iterative process helps develop resilience, critical thinking and evidence-based decision-making.

Experiential Learning and Innovative Project Development

A significant strength of the BNMIT approach is the integration of Design Thinking with project-based and experiential learning. BNMIT’s Innovative Project Lab (IPL) encourages students to generate novel ideas, execute them and iterate until the idea is developed into a meaningful innovation. Every student is involved in innovative projects under faculty guidance, encompassing both hardware and software solutions.

This provides a natural pathway from classroom learning to innovation:

Problem Identification → User Understanding → Ideation → Solution Selection → Prototype → Testing → Iteration → Demonstration → Innovation/Entrepreneurship

Students can therefore apply Design Thinking to areas such as healthcare, agriculture, sustainability, smart systems, assistive technologies, artificial intelligence, IoT, robotics and other emerging technologies.

Linking Design Thinking with Innovation and Entrepreneurship

Design Thinking at BNMIT is not an isolated academic activity. It forms an important foundation for the institution’s wider innovation and entrepreneurship ecosystem.

The BNMIT Innovation and Startup Policy identifies Design Thinking as an important mechanism for generating empathetic ideas and recommends exposing students to entrepreneurship, business thinking, innovation challenges, competitions and entrepreneurial role models.

The progression can be represented as:

Design Thinking → Innovative Idea → Proof of Concept → Prototype → Validation → IPR → Business Model → Incubation → Startup/Technology Transfer

The IIC and ED Cell provide opportunities for promising ideas to move beyond the classroom through ideation competitions, workshops, mentoring, intellectual property awareness, entrepreneurship programmes and pre-incubation activities.

BNMIT has also conducted certificate programmes covering the entrepreneurial journey, problem/user identification and validation, solution development, Design Thinking, prototyping, testing, business modelling and pitching.

Building a Culture of Creativity and Innovation

The ultimate objective of Design Thinking at BNMIT is to create a culture in which students naturally approach problems with curiosity and creativity. The methodology encourages students to ask:

- Who is experiencing the problem?
- What is the real need?
- Why does the problem exist?
- Can the problem be reframed?
- What alternatives are possible?
- Can the solution be rapidly prototyped?
- What does the user think about the solution?
- How can the solution be improved?
- Can the solution create social or economic value?

This approach transforms students from passive recipients of knowledge into problem finders, solution creators and potential innovators.

The interdisciplinary nature of Design Thinking is particularly valuable in engineering education. A healthcare challenge, for example, may require inputs from electronics, computer science, artificial intelligence, mechanical engineering, management and healthcare professionals. Such collaboration develops communication, teamwork and systems thinking alongside technical competence.

Innovation and Design Thinking at BNMIT represents a shift from “learning to solve given problems” to “learning to identify and solve meaningful problem”. By integrating empathy, creativity, analytical thinking, prototyping, experimentation and iteration, students develop the capabilities required for innovation in a rapidly changing technological environment.

The integration of the Design Thinking course with BNMIT’s Innovative Project Lab, IIC, ED Cell and entrepreneurship ecosystem creates a strong pathway from student idea to innovation and potential startup. With continued emphasis on interdisciplinary collaboration, real-world challenges and experiential learning, Design Thinking can become a powerful catalyst for developing technically competent, creative, socially responsible and entrepreneurial engineers at BNMIT.

I & II Semester

INNOVATION and DESIGN THINKING			
Course Code : 21IDT118/128		CIA Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:2	SEA Marks	50
Total Hours of Pedagogy	3	Total Marks	100
Credits	02	Exam Hours	-
Course Category: Foundation			
Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverse engineering, process of design, analytical thinking and ideas, basics and development of creative ways of thinking of every problem the students face in their life,.			
Course objectives:			
1.To explain the concept of design thinking for product and service development			
2.To explain the fundamental concept of innovation and design thinking			
3. To discuss the methods of implementing design thinking in the real world.			
Pedagogy (General Instructions)			
These are sample Strategies, which teacher can use to accelerate the attainment of the various course outcomes.			
1. Lecturer method (L) does not mean only traditional lecture method, but different type ofteaching methods may be adopted to develop for the course outcome.			
2. Assessment should a continuous process.			
3. Show Video/animation films to explain concepts.			
4. Encourage collaborative (Group Learning) Learning in the class.			
5. Ask at least three HOTS (Higher order Thinking) questions in the class, which promotes critical thinking			
6. Adopt Problem Based Learning (PBL), which fosters students Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.			
7. Topics will be introduced in a multiple representation.			
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.			
9. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.			
Module-1(8 hours)			
Empathy For Design Thinking			
Why Empathy?, How to feel?, Visualization of 6 phases of the design thinking process, Journey Mapping, Look outside your context, The power of Storytelling in Empathy, Mini workshops to establish Empathy.			
Pedagogy	• Introduction about the design thinking particularly Empathy : Presentation mode • Workshop mode		
Module-2(4 Hours)			
Define for Design Thinking			
Analysis & Synthesis, Empathy Mapping, Problem Statement, User: Insight, How might We?, Real Time interactions.			
Pedagogy	Case studies on design thinking for real-time interaction and analysis Simulation exercises for collaborated enabled design thinking Live examples on the success of collaborated design thinking		
Module-3 (8 Hours)			
Ideate for Design Thinking			
Introduction of Ideation - Create Thinking - Generating Design Ideas - Lateral Thinking – Analogies – Brainstorming - Mind mapping - SCAMPER - Analytical Thinking - Group Activities Recommended			

Pedagogy	Case studies on design thinking and business acceptance of the design																						
Module-4(8 Hours)																							
Prototype for Design Thinking Types of Prototyping , Guidelines of prototyping, Low Fidelity, High Fidelity Prototyping, Rapid prototyping, Scenario based Prototyping, MVP or Prototyping Mini Workshops/Presentations/Video Case studies																							
Pedagogy	Business model examples of successful designs Simulation on the role of virtual eco-system for collaborated prototyping MVP and Prototyping through live examples and ideas																						
Module-5(8 Hours)																							
Testing Compare Alternatives, Users experience, Observe, Follow ups ,Popular Design Frameworks																							
Pedagogy	4 hours design thinking workshop cum competition. Live project on design thinking in a group of 4/5 students																						
Course Outcomes: Upon the successful completion of the course, students will be able to:																							
CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom’s Taxonomy)																					
CO1	Appreciate various design process procedure	K3																					
CO2	Generate and develop design ideas through differenttechnique	K4																					
CO3	Experience design thinking process in real	K6																					
<table><tr><td>Sl.No.</td><td>Learning Level</td><td>Knowledge Level</td></tr><tr><td>1</td><td>Remember</td><td>K1</td></tr><tr><td>2</td><td>Understand</td><td>K2</td></tr><tr><td>3</td><td>Apply</td><td>K3</td></tr><tr><td>4</td><td>Analyse</td><td>K4</td></tr><tr><td>5</td><td>Evaluate</td><td>K5</td></tr><tr><td>6</td><td>Create</td><td>K6</td></tr></table>			Sl.No.	Learning Level	Knowledge Level	1	Remember	K1	2	Understand	K2	3	Apply	K3	4	Analyse	K4	5	Evaluate	K5	6	Create	K6
Sl.No.	Learning Level	Knowledge Level																					
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2	Understand	K2																					
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5	Evaluate	K5																					
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Assessment Details (both CIA and SEA) (Methods of CIA need to be define topic wise i.e.- MCQ, Quizzes, Open book test, Seminar or micro project) The weightage of Continuous Internal Assessment (CIA) is 100%																							
Continuous Internal Evaluation: 1. Methods suggested: Test, Open Book test, Written Quiz, Seminar, report writing etc. 2. The class teacher has to decide the topic for MCQs, closed book test, open book test, Written Quiz, Live Project and Seminar. In the beginning only teacher has to announce the methods of CIA for the subject.																							

The evaluation pattern for the first year (1/2 Semester) students:

1. Class Room Activities- Total marks-25

Criteria:

- a. Participation-5
- b. Out of box thinking-10
- c. Clarity -5
- d. Content-5

2. Assignment and Mini Prototype- Total Marks- 25 marks

- a. Assignment given- 10 questions - 10 Marks
- b. Prototype/Test Evaluation – 15 Marks

Each group has been asked to create “Wearable watch with medication”.

Criteria:

- | | |
|---------------------------|-----------------------------------|
| a) Prototype. | 15 Marks |
| b) Functionality | 15 Marks |
| c) Creativity | 15 Marks |
| d) Ease of use /Usability | 15 Marks |
| Total | 60 Marks – Scale down to 15 Marks |

2. Internal Exam -50 marks (Lab-based)

50 Questions -Objective/ 25 marks-objective and 25 marks case study/ open ended questions or 50 Marks Objective Type questions.

After the 5th module, this internal test can be conducted along with 3rd internals.

3. Final evaluation at the end of the semester

Total marks-100 marks

- a. Prototype for the Group Project. (2D/3D/Software output/Thermocol Prototype) - 40 Marks
- b. Slide presentation (10 slides, 5 minutes Q&A (Evaluation will be done by a group of evaluators).
- 30 Marks
- c. Card board presentation (5 Modules in one Card Board) - 30 Marks

CO-PO/PSO Mapping:

CO No.	Statement	Bloom's Cognitive level	POs
CO1	To explain the students about the concept of design thinking for product and service development.	Analyzing	1, 4, 5, 6, 9, 12
CO2	To explain and make the students understand the fundamental concept of innovation and design thinking.	Analyzing	3, 4, 10
CO3	To discuss various methods of implementing design thinking in the real world and make the students understand the importance of design thinking in various sectors.	Creating	1, 2, 3, 6

Level 1 – Understanding, Level 2 – Applying, Level 3 – Analyzing, Level 4 – Evaluating, Level 5 – Creating

**CO- PO
mapping**

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
21IDT118 1.1	1			3	3	3	2		3			2
21IDT118 1.2			3	3						3		
21IDT118 1.3	2	2	3			3					2	
Average	2	2	3	3	3	3	2	0	3	3	2	2

CO-PO/PSO	Justification
CO1->PO1(1),PO4(3), PO5(3), PO6(3), PO7(2), PO9(3), PO12(2)	Students will be able to get the knowledge based on Concepts of Design Thinking. With their basic knowledge of Engineering and Research capability and with the help of modern tools used in design thinking along with societal, environmental and sustainability concerns , students will work in groups to achieve a lifelong learning.
CO2->PO3(3),PO4(3), PO10(3)	Students will be able to use the Design / Development of Solutions by investigating complex problems in a very creative manner and communicating the same thing in a very effective presentation to others.
CO3->PO1(2), PO2(2), PO3(3), PO6(3), PO11(2)	Students will be able to apply their engineering knowledge by identifying the problems in a right manner and develop solutions by knowing various implementation strategies thinking as an societal engineer and effectively manage the projects.

Assessment processes:

- i. Internal test / MCQs
- ii. Assignment
- iii. Presentation
- iv. Class interactions
- v. Simulations
- vi. Chart Presentations
- vii. Class Activities
- viii. Mini Prototype Development

Assessment tool:

- i. Green books
- ii. Mini Prototype evaluation
- iii. Class Activity Assessment

Assessment plan:

CO (Cognitive Level)	Class Activities	Assignment	Prototype Presentation	MCQ
CO1- Understand, Apply, Analyse	Understand, Apply,			Understand, Apply
CO2- Understand, Apply, Analyse	Understand, Apply, Analyse			Understand, Apply
CO3- Evaluate, Create		Understand, Apply	Evaluate, Create	Understand, Apply

Suggested Learning Resources:

Text Books :

1. John.R.Karsnitz, Stephen O'Brien and John P. Hutchinson, "Engineering Design", Cengage learning (International edition) Second Edition, 2013.
2. Roger Martin, "The Design of Business: Why Design Thinking is the Next Competitive Advantage", Harvard Business Press , 2009.
3. Hasso Plattner, Christoph Meinel and Larry Leifer (eds), "Design Thinking: Understand – Improve – Apply", Springer, 2011
4. Idris Mote, "Design Thinking for Strategic Innovation: What They Can't Teach You at Businessor Design School", John Wiley & Sons 2013.

References:

5. Yousef Haik and Tamer Schahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
6. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

Web links and Video Lectures (e-Resources):

1. www.tutor2u.net/business/presentations/. /product lifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Development
4. <http://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competition>
6. www.vertabelo.com/blog/documentation/reverse-engineering
<https://support.microsoft.com/en-us/kb/273814>
7. <https://support.google.com/docs/answer/179740?hl=en>
8. <https://www.youtube.com/watch?v=2mjSDIBaUIM> thevirtualinstructor.com/foreshortening.html
<https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>
<https://dschool.stanford.edu/use-our-methods/> 6. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process> 7.
<http://www.creativityatwork.com/design-thinking-strategy-for-innovation/> 49 8.
<https://www.nngroup.com/articles/design-thinking/> 9.
<https://designthinkingforeducators.com/design-thinking/> 10.
www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf
<https://dschool.stanford.edu/groups/k12/wiki/c0be1/Prototype.html>
<https://www.nngroup.com/articles/ideation-in-practice/>
<https://www.interaction-design.org/courses/design>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning<http://dschool.stanford.edu/dgift/>

I & II Semester

INNOVATION and DESIGN THINKING			
Course Code : 23IDT118/128		CIA Marks	50
Teaching Hours/Week (L:T:P: S)	0:2:0:0	SEA Marks	50
Total Hours of Pedagogy	2	Total Marks	100
Credits	01	Exam Hours	-
Course Category: Foundation			
Preamble: This course provides an introduction to the basic concepts and techniques of engineering and reverse engineering, process of design, analytical thinking and ideas, basics and development of creative ways of thinking of every problem the students face in their life,.			
Course objectives:			
1. To explain the concept of design thinking for product and service development			
2. To explain the fundamental concept of innovation and design thinking			
3. To discuss the methods of implementing design thinking in the real world.			
Module-1(6 hours)			
Empathy For Design Thinking			
Why Empathy?, How to feel?, Visualization of 6 phases of the design thinking process, Journey Mapping, Look outside your context, The power of Storytelling in Empathy.			
Define for Design Thinking			
Analysis & Synthesis, Empathy Mapping, Problem Statement, User: Insight, How might We?, Real Time interactions.			
Pedagogy	• Introduction about the design thinking particularly Empathy : Presentation mode • Empathy mapping		
Module-2 (6 Hours)			
Ideate for Design Thinking			
Introduction of Ideation - Create Thinking - Generating Design Ideas - Brainstorming - Mind mapping - SCAMPER - Analytical Thinking - Group Activities Recommended			
Pedagogy	• Case studies on design thinking and business acceptance of the design		
Module-3 (6 Hours)			
Prototype for Design Thinking			
Types of Prototyping , Guidelines of prototyping, Low Fidelity, High Fidelity Prototyping, Rapid prototyping, Scenario based Prototyping, MVP or Prototyping.			
Mini Workshops/Presentations/Video Case studies			
Pedagogy	• Business model examples of successful designs • Simulation on the role of virtual eco-system for collaborated prototyping • MVP and Prototyping through live examples and ideas		
Module-4 (6 Hours)			
Testing			
Compare Alternatives, Users experience, Observe, Follow ups , Popular Design Frameworks			
Pedagogy	• 4 hours design thinking workshop cum competition. • Live project on design thinking in a group of 4/5 students		
Module-5 (6 Hours)			
Entrepreneurship Development			
Meaning of entrepreneur, Evolution of the concept, Functions of an Entrepreneur, Types of Entrepreneurs, Intrapreneur			
Role of Central Government and State Government in promoting Entrepreneurship - Introduction to various incentives, subsidies and grants - Export Oriented Units - Fiscal and Tax concessions available- Start Up India scheme, Venture Capitalist & Angel investors			
Pedagogy	• Presentation & Interaction from Entrepreneurs		

Course Outcomes:

Upon the successful completion of the course, students will be able to:

CO Nos.	Course Outcomes	Knowledge Level (Based on revised Bloom's Taxonomy)
CO1	Appreciate various design process procedure	L3
CO2	Generate and develop design ideas through different technique	L4
CO3	Experience design thinking process in real	L6
CO4	Demonstrate an understanding of the concept and evolution of entrepreneurship and evaluate the role of government initiatives, incentives, and financial support systems	L4

Sl.No.	Learning Level	Knowledge Level
1	Remember	K1
2	Understand	K2
3	Apply	K3
4	Analyse	K4
5	Evaluate	K5
6	Create	K6

Assessment Details (both CIA and SEA)

(Methods of CIA need to be define topic wise i.e.- MCQ, Quizzes, Open book test, Seminar or micro project)

The weightage of Continuous Internal Assessment (CIA) is 100%

Continuous Internal Evaluation:

1. Methods suggested: Test, Open Book test, Written Quiz, Seminar, report writing etc.
2. The class teacher has to decide the topic for MCQs, closed book test, open book test, Written Quiz, Live Project and Seminar. In the beginning only teacher has to announce the methods of CIA for the subject.

CO-PO/PSO Mapping:

CO No.	Statement	Bloom's Cognitive level	POs
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CO2	To explain and make the students understand the fundamental concept of innovation and design thinking.	Analyzing	3, 4, 10
CO3	To discuss various methods of implementing design thinking in the real world and make the students understand the importance of design thinking in various sectors.	Creating	1, 2, 3, 6
CO4	To Demonstrate an understanding of the concept and evolution of entrepreneurship and evaluate the role of government initiatives, incentives, and financial support systems	Analyzing	1, 4, 5, 6, 9, 12

Level 1 – Understanding, Level 2 – Applying, Level 3 – Analyzing, Level 4 – Evaluating, Level 5 – Creating

CO- PO mapping

Course Outcome	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12
21IDT118 1.1	2			3	3	3	2		3			2
21IDT118 1.2			3	3						3		
21IDT118 1.3	2	2	3			3					2	
21IDT118 1.4	2			3	3	3	2		3			2
Average	2	2	3	3	3	3	2	0	3	3	2	2

CO-PO/PSO	Justification
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CO3->PO1(2), PO2(2), PO3(3), PO6(3), PO11(2)	Students will be able to apply their engineering knowledge by identifying the problems in a right manner and develop solutions by knowing various implementation strategies thinking as an societal engineer and effectively manage the projects.
CO4->PO1(1),PO4(3), PO5(3), PO6(3), PO7(2), PO9(3), PO12(2)	Students will be able to get the knowledge based on Entrepreneurship. With their basic knowledge of Engineering and Research capability and with the help of modern tools used in design thinking along with societal, environmental and sustainability concerns, students will work in groups to achieve a lifelong learning.

Assessment processes:

- Internal test / MCQs
- Assignment
- Presentation
- Class interactions
- Simulations
- Chart Presentations
- Class Activities
- Mini Prototype Development

Assessment tool:

- Green books
- Mini Prototype evaluation
- Class Activity Assessment

iv. Assessment plan:

CO (Cognitive Level)	Class Activities	Assignment	Prototype Presentation	MCQ
CO1- Understand, Apply, Analyse	Understand, Apply,			Understand, Apply
CO2- Understand, Apply, Analyse	Understand, Apply, Analyse			Understand, Apply
CO3- Evaluate, Create		Understand, Apply	Evaluate, Create	Understand, Apply
CO4- Understand, Apply, Analyse	Understand, Apply,			Understand, Apply

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5. Entrepreneurship, Donald F. Kuratko and Richard M. Hodgetts, South-Western, 2012.
6. Entrepreneurship Development, Gupta S.L., Arun Mittal, International Book House, 2012

References:

1. Yousef Haik and Tamer Schahin, "Engineering Design Process", Cengage Learning, Second Edition, 2011.
2. Book - Solving Problems with Design Thinking - Ten Stories of What Works (Columbia Business School Publishing) Hardcover – 20 Sep 2013 by Jeanne Liedtka (Author), Andrew King (Author), Kevin Bennett (Author).

Web links and Video Lectures (e-Resources):

1. www.tutor2u.net/business/presentations/. /product lifecycle/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Development
4. <https://www.mindtools.com/brainstm.html>
5. <https://www.quicksprout.com/. /how-to-reverse-engineer-your-competition>
6. www.vertabelo.com/blog/documentation/reverse-engineering
<https://support.microsoft.com/en-us/kb/273814>
7. <https://support.google.com/docs/answer/179740?hl=en>
8. <https://www.youtube.com/watch?v=2mjSDIBaUIM> thevirtualinstructor.com/foreshortening.html
<https://dschool.stanford.edu/.../designresources/.../ModeGuideBOOTCAMP2010L.pdf>
<https://dschool.stanford.edu/use-our-methods/> 6. <https://www.interaction-design.org/literature/article/5-stages-in-the-design-thinking-process> 7.
<http://www.creativityatwork.com/design-thinking-strategy-for-innovation/> 49 8.
<https://www.nngroup.com/articles/design-thinking/> 9.
<https://designthinkingforeducators.com/design-thinking/> 10.
www.designthinkingformobility.org/wp-content/.../10/NapkinPitch_Worksheet.pdf
<https://dschool.stanford.edu/groups/k12/wiki/c0be1/Prototype.html>
<https://www.nngroup.com/articles/ideation-in-practice/>
<https://www.interaction-design.org/courses/design>
<https://onlinecourses.swayam2.ac.in/cec20 mg19/preview>

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning <http://dschool.stanford.edu/dgij/5>