**I Semester**

| INNOVATION and DESIGN THINKING | | | |
|---|---|---|---|
| Course Code | BIDTK158/258 | CIE Marks | 50 |
| Teaching Hours/Week (L: T:P: S) | 1:0:0 | SEE Marks | 50 |
| Total Hours of Pedagogy | 15 | Total Marks | 100 |
| Credits | 01 | Exam Hours | 01 |

**Course Category:** Foundation
**Preamble:** This course provides an introduction to the basic concepts and techniques of engineering and reverses engineering, the process of design, analytical thinking and ideas, basics and development of engineering drawing, application of engineering drawing with computer aide.
**Course objectives:**
- To explain the concept of design thinking for product and service development
- To explain the fundamental concept of innovation and design thinking
- To discuss the methods of implementing design thinking in the real world.

**Teaching-Learning Process (General Instructions)**

These are sample Strategies; which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Video/animation films to explain concepts
3. Encourage collaborative (Group Learning) Learning in the class
4. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develops thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

| Module-1 | |
|---|---|
| **PROCESS OF DESIGN** **Understanding Design thinking** Shared model in team-based design – Theory and practice in Design thinking – Explore presentation signers across globe – MVP or Prototyping | |
| **Teaching-Learning Process** | Introduction about the design thinking: Chalk and Talk method Theory and practice through presentation MVP and Prototyping through live examples and videos |

| Module-2 | |
|---|---|
| **Tools for Design Thinking** Real-Time design interaction capture and analysis – Enabling efficient collaboration in digital space – Empathy for design – Collaboration in distributed Design | |
| **Teaching-Learning** | Case studies on design thinking for real-time interaction and analysis |

| Process | Simulation exercises for collaborated enabled design thinking |
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| | Live examples on the success of collaborated design thinking |

| Module-3 |
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**Design Thinking in IT**

Design Thinking to Business Process modelling – Agile in Virtual collaboration environment – Scenario based Prototyping

| Teaching-Learning Process | Case studies on design thinking and business acceptance of the design |
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| | Simulation on the role of virtual eco-system for collaborated  prototyping |

| Module-4 |
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**DT For strategic innovations**

Growth – Story telling representation – Strategic Foresight - Change – Sense Making - Maintenance Relevance – Value redefinition - Extreme Competition – experience design - Standardization – Humanization - Creative Culture – Rapid prototyping, Strategy and Organization – Business Model design.

| Teaching-Learning Process | Business model examples of successful designs |
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| | Presentation by the students on the success of design |
| | Live project on design thinking in a group of 4 students |

| Module-5 |
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Design thinking workshop

Design Thinking Work shop Empathize, Design, Ideate, Prototype and Test

| Teaching-Learning Process | 8 hours design thinking workshop from the expect and then presentation by the students on the learning from the workshop |
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**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 | K2 |
| CO2 | Generate and  develop  design  ideas  through  different technique | K2 |
| CO3 | Identify  the significance  of reverse Engineering toUnderstand products | K2 |
| CO4 | Draw technical drawing for design ideas | K3 |

## Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50). The minimum passing mark for the SEE is 35% of the maximum marks (18 marks out of 50). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50) in the semester-end examination(SEE), and a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

**Continuous Internal Evaluation (CIE):**

- Two Tests (preferably in MCQ pattern ) each of **30 Marks;** The first test after the completion of the 40 -50% syllabus of the course. A second test after the completion of 90-100% of the syllabus of the course.

- Two Assignments/two quizzes/two seminars/one field survey and report presentation/one-course project totaling **40 marks**

Total Marks scored (test + assignments) out of 100 shall be scaled down to **50 marks**

At the beginning of the semester, the instructor/faculty teaching the course has to announce the methods of CIE for the course.

The Teachers shall choose the types of assignments depending on the requirement of the course and plan to attain the Cos and POs. (to have a less stressed CIE, the portion of the syllabus should not be common /repeated for any of the methods of the CIE. Each method of CIE should have a different syllabus portion of the course). CIE methods /test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

**Semester-End Examination:**

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for subject

SEE paper will be set for 50 questions of each of 01 marks. The pattern of the question paper is MCQ. The time allotted for SEE is **01 hour**

**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 Mootee, "Design Thinking for Strategic Innovation: What They Can't Teach You at Business or Design School", John Wiley & Sons 2013.

**References**:

5. Yousef Haik and Tamer M.Shahin, "Engineering Design Process", CengageLearning, 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/. /**productlifecycle**/default.html
2. https://docs.oracle.com/cd/E11108_02/otn/pdf/. /E11087_01.pdf
3. www.bizfilings.com › Home › Marketing › Product Developmen
4. https://www.mindtools.com/brainstm.html
5. https://www.quicksprout.com/. /how-to-**reverse-engineer**-your-competit
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=2mjSDIBaUlM
   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

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

https://onlinecourses.nptel.ac.in/noc19_mg60/preview

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