



RAGHU ENGINEERING COLLEGE (Autonomous)

(Approved by AICTE, New Delhi & Permanently Affiliated to JNTUGV, Vizianagaram)
NBA and NAAC 'A+' grade accredited Institute.

Dakamarri, Bheemili Mandal, Visakhapatnam – 531162, A.P.

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INSTITUTE VISION

Envisioning to be a world class technical institution by synergizing quality education with ethical values.

INSTITUTE MISSION

- To encourage training and research in cutting-edge technologies.
- To develop and strengthen strategic links with the industry.
- To kindle the zeal among the students and promote their quest for academic excellence.
- To encourage extra-curricular activities along with good communication skills.

QUALITY POLICY

RAGHU Engineering College underscores ethical values along with innovative teaching through an interactive, activity-based pedagogy; establishes the best of infrastructural facilities, inculcates engineering temper among the students through the use of the latest Information and Communication Technologies, and strives for an efficient, responsive and transparent administration in all areas.

Department of Civil Engineering

VISION

To become a pioneer in the field of civil engineering by providing high quality education and research to serve the public consistently with competitive spirit professional ethics.

MISSION

- M1: Provide quality knowledge and advance skills to the students in order to expertise theoretically and practically in the areas of civil engineering.
- M2: Improve the professional potentiality of the students and staff through educational programs to expand the knowledge in the field of civil engineering
- M3: Inculcate healthy competitive spirit towards the higher education and successful career in the field of civil engineering to serve the nation ethically.

PROGRAMME EDUCATIONAL OBJECTIVES(PEOs)

- PEO 1: Employ a practicing civil engineer in construction, design, testing, and allied fields.
- PEO 2: Engaging in self-directed learning research or undertaking higher studies in the rapidly changing civil engineering environment.
- PEO 3: Create new methods/processes to meet the needs of society with their civil engineering knowledge.

MAPPING OF MISSION STATEMENTS WITH PEOs

MS/PEO	PEO 1	PEO 2	PEO 3
MS 1	3	3	2
MS 2	3	3	2
MS 3	3	3	2

1-Slight, 2- Moderate, 3- Substantial

PROGRAM OUTCOMES

Graduates of Civil Engineering Will:

PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem analysis: Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/development of solutions: Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems: Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage: Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society: Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability: Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics: Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work: Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication: Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.

PO 11	Project management and finance: Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning: Recognize the need for, and have the preparation and ability to engage in independent and life-long learning in the broadest context of technological change.
PROGRAM SPECIFIC OUTCOMES (PSOs)	
PSO 1: Analyze, design and execute the civil engineering structures with good knowledge in engineering, mathematics & basic sciences.	
PSO 2: Follow the economic, environmental and safety factors involved in the construction industry.	

Mapping of PEOs with POs and PSOs

PEO/ PO	PO -1	PO -2	PO -3	PO -4	PO -5	PO -6	PO -7	PO -8	PO -9	PO -10	PO -11	PO -12	PSO -1	PSO -2
PEO 1	3	3	3	2	3	2	2	2	3	3	3	3	3	3
PEO 2	3	3	3	2	3	2	2	1	3	3	3	3	3	2
PEO 3	3	3	3	3	3	1	1	1	2	3	2	3	3	2

1-Slight , 2- Moderate, 3- Substantial

23ES214– Design Thinking & Innovation							
Programme & Branch	B.Tech & CIVIL	Sem	Category	L	T	P	Credits
Prerequisites	Nil	4	Engineering Science	1	0	2	2
Course Objectives: <ol style="list-style-type: none"> To familiarize students with design thinking process as a tool for breakthrough innovation. To equip students with design thinking skills and ignite the minds to create innovative ideas, develop solutions for real-time problems. 							
Preamble:	The aim of this course is to give knowledge about design and innovation and best solutions of a given problem by an appropriate and innovative design through the best investigation and design protocol for the particular problem in practical aspects.						
Course Contents:							
Unit-1	Introduction to Design Thinking					Contact Hours: 3	
Introduction to elements and principles of Design, basics of design-dot, line, shape, form as fundamental design components. Principles of design. Introduction to design thinking, history of Design Thinking, New materials in Industry.							
Unit-2	Design Thinking Process					Contact Hours: 3	
Design thinking process (empathize, analyze, idea & prototype), implementing the process in driving inventions, design thinking in social innovations. Tools of design thinking - person, costumer, journey map, brainstorming, product development. Activity: Every student presents their idea in three minutes, every student can present design process in the form of flow diagram or flow chart etc. Every student should explain about product development.							
Unit-3	Innovation					Contact Hours: 3	
Art of innovation, Difference between innovation and creativity, role of creativity and innovation in organizations- Creativity to Innovation- Teams for innovation- Measuring the impact and value of creativity. Activity: Debate on innovation and creativity, Flow and planning from idea to innovation, Debate on value-based innovation							
Unit-4	Product Design					Contact Hours: 3	
Problem formation, introduction to product design, Product strategies, Product value, Product planning, product specifications- Innovation towards product design- Case studies Activity: Importance of modelling, how to set specifications, Explaining their own product design.							

Unit-5		Design Thinking in Business Processes	Contact Hours: 3
Design Thinking applied in Business & Strategic Innovation, Design Thinking principles that redefine business – Business challenges: Growth, Predictability, Change, Maintaining Relevance, Extreme competition, Standardization. Design thinking to meet corporate needs Design thinking for Startups- Defining and testing Business Models and Business Cases Developing & testing prototypes. Activity: How to market our own product, About maintenance, Reliability and plan for startup.			
			Total Hours: 15
Text Books:			
1	Tim Brown, Change by design, Harper Bollins (2009).		
2	Idris Mootee, Design Thinking for Strategic Innovation, 2013, John Wiley & Sons.		
Reference Books:			
1	David Lee, Design Thinking in the Classroom, Ulysses press		
2	Shrutin N Shetty, Design the Future, Norton Press		
3	William Lidwell, Universal Principles of Design- Kritinaholden, Jill Butter.		
4	Chesbrough. H, The Era of Open Innovation – 2013		
Web References:			
1	https://nptel.ac.in/courses/110/106/110106124/		
2	https://nptel.ac.in/courses/109/104/109104109/		
3	https://swayam.gov.in/nd1_noc19_mg60/preview		
COURSE OUTCOMES: Upon completion of the course, students shall have ability to			BT Mapped (Highest Level)
CO 1	Explain the fundamentals of Design Thinking and innovation.		L2
CO 2	Apply the design thinking techniques for solving problems in various sectors.		L3
CO 3	Analyze to work in a multidisciplinary environment.		L4
CO 4	Evaluate the value of creativity.		L5
CO5	Formulate specific problem statements of real time issues.		L6

Mapping of Cos with POs and PSOs:

[illegible]