NE 264 – Scientific Thinking

C O U R S E I N F O R M A T I O N

Course Title: Scientific Thinking
Code: NE 264

Contact Hours (hours/week): Lecture – 2 Hrs. Credit – 3.

Prerequisite: None

Course Coordinator: Dr. El Tantawy Farid

G R A D I N G

Class Performance/Attendance:	10%
Midterm # 1/Assignments – (7^{th} Week):	30%
Midterm # 2/Assignments – (12^{th} Week):	20%
Final Exam:	40%

C O U R S E D E S C R I P T I O N

Nature of thinking, Evolution of scientific thinking, Definition of scientific thinking, CHARACTERISTICS of Scientific Thinking, : Postulates of Scientific Thinking, Objectives of Scientific Thinking, Processes of Scientific Thinking, Observation, Experimenting, scientific hypothesis, Classification, Analysis, Synthesis, Interpreting data, Using numbers, Inference, Mathematical thinking, Induction, Deduction, Generalization, Reflection, Discovering relations, Mathematical translation, The formal logic, Mathematical proof, Basic presentation skills, Definition of CREATIVE Thinking, Components of creative thinking, Fluency , Flexibility , Originality , Elaboration , Creative thinking methods , Generating new ideas , Morphological analysis , Creative problem solving , Brain storming , RESEARCH Methods In Engineering Sciences , Fields of communication engineering , Communication engineering projects , communication engineering subjects and themes , Applications of communication engineering , Fields of construction engineering , construction engineering projects , construction engineering subjects and themes , Applications of construction engineering , Fields of power engineering , power engineering projects , power engineering subjects and themes , Applications of power engineering, : Methods and Techniques of develop Scientific Thinking, Problems solving, Definition of problem solving, Algorithm, Kinds of problems, Steps of problem solving , Scientific inquiry , Scientific inquiry steps , Difference Reduction Method , Problems solving by Analogy , General strategy to solve the problem , Decisions making process , Definition of decision making , Stage of decision making process , Decision classification , Relation between decision making and problem solving , MODELS of scientific thinking , Polya model, Carkuff model , Frank Lester model , Lee model .

TEXT BOOKS

Scientific Thinking, ASS. Prof. MOHAMMED HAMADA.

REFERENCE BOOKS

References available in the Academy library

COURSE AIM

The main goal of the course is to develop the thinking skills of engineering and technology students.

COURSE OBJECTIVES

The objectives of the course is to have students learn to define science use reasoning skills such as, analysis, synthesis, including, deducing, increasing, apply the methods science to solve problems, use creative thinking skills in real situations, and use research methods in engineering sciences.

COURSE OUTLINE

Week Number 1: Thinking Patterns Development.

Week Number 2: Meaning & Construction of Science + Scientific Values & Directions.

Week Number 3: Science, non-science & other-than science + science, Engineering & Technology.

Week Number 4: Properties of science.

Week Number 5: Objectives of science + postulates of scientific thinking.

Week Number 6: Mental operations used in science+ scientific guessing.

Week Number 7: Types of deductions + presentation.

Week Number 8: Research methods in mathematical sciences+ postulates, definitions.

Week Number 9: Research methods in natural Sciences.

Week Number 10: Experiments & observations + scientific postulates & their conditions.

Week Number 11: Verification of scientific postulates.

Week Number 12: Problem solving + general methods of problems solving.

Week Number 13: Creative thinking + Fluency types.

Week Number 14: Flexibility & originality + Basics of brain storming .

Week Number 15: Revision.

Week Number 16: Final Exam.