



THIAGARAJAR COLLEGE OF ENGINEERING - MADURAI 625 015  
TCE-III

S.No	One credit course need analysis sheet	
1.	Name of the Course	NUCLEAR ENGINEERING - BASICS
2.	Name of the Industry	CONSULTANT
3.	Name of the SIG associated with	THERMAL ENGINEERING
4.	Motivation for offering the course	
4.1	Feedback (If yes, Details of the feedback as per the annexure I)	
	From Recruiter	Y/N    2
	From Employer	Y/N    2
	From Alumni	Y/N    2
	From Academic Council members	Y/N    2
	From Board of Studies members	Y/N    2
	From Senior students	Y/N    2
	From current students	Y/N    2
	From Performance Assessment Committee	Y/N    2
	From Department Advisory committee	Y/N    YES.
4.2	Faculty participation in Seminar/FDP (If yes, details)	
	At higher learning institutes	-
	At Industry	-
5.	Outcomes expected	
	Technology transfer	-
	Student Internship	YES
	Placement	YES
	Organizing FDP/seminar at TCE	-
	Collaborative research/consultancy projects	YES
	Faculty as Trainee/Trainer in the Industry	-
	Joint publications	-
	Setting up of Lab/Infrastructure	-

Sub Code	Lectures	Tutorial	Practical	Credit
G1 x	-	-	-	1

## G1 x Nuclear Engineering - Basics

1:0

### Preamble

Nuclear engineering is the branch of science that deals with theory of fission and fusion, nuclear reactors and preventive maintenance such as protection from radiation. In order to understand the construction and operation of nuclear reactors, it is necessary to have a basic grounding in atomic physics. The course provides a fundamental knowledge in nuclear power generation and nuclear power plant operation.

### Program Outcomes addressed

- Graduates will demonstrate knowledge of mathematics, science and engineering.
- Graduates will demonstrate an ability to identify, formulate and solve engineering problems.
- Graduates will demonstrate skills to use modern engineering tools, software's and equipment to analyze problems.

### Competencies

At the end of the course the students will be able to

- Explain theory of fission and fusion
- Explain nuclear plant description
- Explain the working of nuclear power plants
- Explain prevention of radiation from nuclear power plants

### Assessment Pattern

- Out of 100 marks, 50 marks (Internal) will be for assignments / seminars with presentation and 50 marks will be for end semester exam.
- End semester question pattern will be a combination of both multiple choice and descriptive questions.

## Course Contents and Lecture Schedule

No.	Topic	No. of Lectures
<b>1</b>	<b>Introduction</b>	
1.1	National and international scenario on nuclear power	1
1.2	Atoms, electrons, Protons, Nucleus, Neutrons, Scattering, Thermal neutrons, controlled and uncontrolled chain reactions	1
1.3	Fission of nucleus, basis for power generation, future power generation by fusion	2
<b>2</b>	<b>Nuclear power generating systems</b>	
2.1	Boiling water reactors (BWR), Pressurized water reactors (PWR), Pressurized heavy water reactors (PHWR)	1
2.2	Gas cooled thermal reactors (HTGR), Liquid metal cooled fast breed reactor (LMFBR), Light water breed reactor (LWBR)	
<b>3</b>	<b>Description of plant</b>	
3.1	Site characteristics, structures, components, equipment & systems, reactor	1
3.2	Coolant systems, safety features, instrumentation & controls	1
3.3	Electric power systems, auxiliary systems, radiative waste management	1
<b>4</b>	<b>Radiation Protection</b>	
4.1	History, units of radiation ( Roentgen, exposure rate, imparted energy, Rad, Rem ), Effects on the human cell	2
4.2	Radiation protection and dose limiting recommendation	1
<b>5</b>	<b>World's Nuclear reactors and plant operation</b>	
5.1	Nuclear plants in Limerick, south Texas and Kudan kulam	1
5.2	Accidents occurred in three mile island plant, Chernoble and Fukushima plants and the variable causes ( cooling water loss, control rod drive failure and insufficient training of operating personnel)	1

5.3	Plant operation in i) start-up ( cold, hot and normal) ii) shut down (unloading of turbine-generator, maintain steam generator level, Boron dilution)	1
5.4	Preventive maintenance and corrective maintenance	1
5.5	Safety Standards for Nuclear power plant	1
<b>Total hours</b>		<b>16</b>

**Course Designer: Prof.C.Kothandaraman**

**Biography:**

Prof.C.Kothandaraman is an expert in Design and development & maintenance of Nuclear power plants and he has earned more than 28 years of experience in this field. He was professor in Thiagarajar College of engineering for six years and was instrumental in erecting boiler and other accessories in steam lab and I.C.Engines lab. He is currently correspondent of Nagalakshmi Ammal College of Arts & Science and is a frequent traveler to U.S and other countries for consultancy work on nuclear power projects.

THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI-15  
DEPARTMENT OF MECHANICAL ENGINEERING

“G1K – Nuclear Engineering – Basics”

Final Exam on – 04.04.2014 – Friday - Afternoon

VI – sem – B.E-Mech – A - Section

SL.NO	REG. NO	NAME	signature
1	11G08	M.ANBU MARAN	
2	11G09	K.ARAVINDHAN	
3	11G13	A.ARUN KUMAR	
4	11G14	R.ARUN KUMAR	
5	11G33	S.GIRIRAJ	
6	11G37	V.HEMANTH KUMAR	
7	11G39	K.JANARTHAN	
8	11G42	G.KAANDEEPA RAAJAN	
9	11G44	KALYAN SURYA JAGAN	
10	11G56	K.R.MANOJ PRABAKAR	
11	12LG02	S.DEENA DHAYALAN	

VI – sem – B.E-Mech – B – Section

SL.NO	REG. NO	NAME	signature
1	11G68	S.POOVAGAN	
2	11G71	S.PRASANTH	
3	11G72	G.PREM KUMAR	
4	11G73	M.S.PREM KUMAR	
5	11G74	D.S.PRITVI RAJA DURAI	
6	11G76	K.R.RAGHUL	
7	11G82	M.RAM GAUTHAM	
8	11G86	T.SABARINATH	
9	11G89	P.SANKAR	
10	11G92	G.SARAVANA KUMAR	
11	11G94	K.SARAVANAN	
12	11G95	P.SATHASIVAM	
13	11G98	R.SETHUPATHY	
14	11G101	S.SIDDHARTH	
15	11G106	P.SURESH KUMAR	
16	11G112	V.VASUDEVAN	
17	11G113	A.VEERA JEGAN	
18	11G117	T.VIKNESH	
19	12LG04	B.GANESH	



THIAGARAJAR COLLEGE OF ENGINEERING, MADURAI -625 015  
Department of Mechanical Engineering

One credit course on "Nuclear Engineering-Basics" on 09<sup>th</sup> & 16<sup>th</sup> February 2014  
offered to VI-sem B.E-Mech. Engg students

23  
16-02-2014

Name of the Expert	Prof.C.Kothandaraman, Consultant, Nuclear Power Plants
Name of the coordinator	A. Samuel Raja, Asst. Prof., Dept. of Mech. Engg., TCE.

**Feedback Form**

Please rate the following parameters in a scale of 1 to 4, where

1. Poor  
2. Average

3. Good  
4. Excellent

(Please ROUND the appropriate rating)

Sl. No.	Parameters	1	2	3	4
1	Content delivery	1	2	3	4
2	Live examples	1	2	3	4
3	Case studies	1	2	3	4
4	Topic coverage	1	2	3	4
5	Presentation	1	2	3	4
6	Interaction with participants	1	2	3	4
7	Hall Arrangements	1	2	3	4
8	Time Management	1	2	3	4
9	Motivation to do further work	1	2	3	4
10	Overall arrangements	1	2	3	4
Any other suggestions for the improvement	EXAMPLES COULD HAVE BEEN GIVEN ON THE MODERN STATE OF THE ART TECH UNDER DEVELOPMENT				
Rated By : K. R. RAGHUL	Signature :				