

Course Number and Name	
BGE009 – NUCLEAR ENGINEERING	
Credits and Contact Hours	
3&45	
Course Coordinator's Name	
Dr.Shanmuganandh	
Text Books and References	
<p><b>TEXT BOOKS:</b></p> <p>1. M.M.E.I Wakil, Nuclear Power Engineering, International Textbook Company.</p> <p><b>REFERENCES:</b></p> <p>1. R.L.Murray, Introduction to Nuclear Engineering, Prentice hall.  2. M.M.E.I Wakil, Nuclear Power Engineering ,International Textbook company  3. Gasstone, Nuclear Reactor Engineering ,CBS 1998  4. M.M.E.I Wakil, Nuclear energy conservation, International Textbook Company.  5. <a href="http://www.springer.com/us/book/9783642488788">www.springer.com/us/book/9783642488788</a></p>	
Course Description	
To gain some fundamental knowledge about nuclear physics, nuclear reactor, nuclear fuels, reactors and safe disposal of nuclear wastes.	
Prerequisites	Co-requisites
THERMAL ENGINEERING	Nil
required, elective, or selected elective (as per Table 5-1)	
Non Major Elective	
Course Outcomes (COs)	
CO1	Will gain some fundamental knowledge about nuclear physics.
CO2	Will acquire knowledge about nuclear reactor.
CO3	Will understand about nuclear fuels and will become capable of handling nuclear waste.
CO4	Will understand about core thermal design
CO5	Will understand about Disposal of Radio active waste
CO6	To learn about boiling water reactor

Student Outcomes (SOs) from Criterion 3 covered by this Course													
COs/SOs	a	b	c	d	e	f	g	h	i	j	k	l	
CO1	M												
CO2					H			M					H
CO3	M												H
CO4					H					L			H
CO5	M		H		H								H
CO6													
List of Topics Covered													
<b>UNIT I ATOMIC STRUCTURE AND NUCLEAR REACTORS &amp; NEUTRONS AND INTERACTION 8</b>													
Atomic structure, Nuclear Equation- Energy from nuclear reactions –fusion and fission, nuclear technology, conversion and breeding –Radio activity, effect of radiation. Thermal neutrons, buckling factor, nuclear cross-section, Neutron flux, Volumetric Thermal Source strength-Fission, cross-section in reactors.													
<b>UNIT II NEUTRON FLUX DISTRIBUTION 10</b>													
Neutron life cycle, neutron conservation equation, diffusion equations, reflectors and their effect, Reactivity and reactivity period-Multiplication factor. Void and Void factor, Flow and non-flow system, simple problems-Boiling and non boiling heights, Friction drop in a two-phase channel													
<b>UNIT III REACTOR HEAT GENERATION 8</b>													
Heat conduction in reactor elements, heat flow of solid planes.Types of fuel elements. Heat flow out of spherical fuel elements, Effect of cladding and coolant absorption of core radiation, Heat removal in slab subjected to radiation, problems, Thermal shields, secondary Radiation													
<b>UNIT IV CORE THERMAL DESIGN 10</b>													
General consideration ,Ariel Temperature ,Distribution of fuel element and coolant, Maximum temperature in fuel elements, Problems, coolant channel orificing, hotspot factors, Core thermal design ,selection of fuel materials, cladding, coolant, moderator, control rods- structural parts- safety considerations and site solution –Disposal of Radio active waste													
<b>UNIT V REACTORS 9</b>													
Boiling water reactor- B.W.R modified Rankine cycle, Heavy water reactors, as cooled Reactor, liquid metal cooled reactor, Compatibility of liquid metal coolant. Site layout, Shielding and containment decontamination, Hazard evaluation and likening.													