NATIONAL INSTITUTE OF TECHNOLOGY, TIRUCHIRAPPALLI

DEPARTMENT OF ENERGY AND ENVIRONMENT

COURSE PLAN – PART I			
Name of the programme and specialization	B M. TECH – ~~ENERGY ENGINEERING~~ MINOR COURSE (7TH SEM)		
Course Title	SOLAR THERMAL TECHNOLOGY		
Course Code	ENMI14	No. of Credits	3
Course Code of Pre-requisite subject(s)	-		
Session	JULY 2019	Section (if, applicable)	-
Name of Faculty	Dr. M. Premalatha	Department	ENERGY AND ENVIRONMENT
Official Email	latha@nitt.edu	Telephone No.	+91 9894600407
Name of Course Coordinator(s) (if, applicable)	DR. N. ANANTHARAMAN		
Official E-mail		Telephone No.	
Course Type (please tick appropriately)	☐ Core course	☑ Elective course	

Syllabus (approved in BoS)

- Unit 1: Introduction to course, Solar systems, Introduction to Flat plate collectors, Solar Radiation: Definitions, Angles, Shading, and Extraterrestrial Radiation. Radiation Data & Processing.
- Unit 2: Energy and atmosphere issues in a global context. Radiation on Sloped Surfaces, Utilizability Concepts, Heat Transfer Topics, Radiation fundamentals, Spectral Radiation Properties, Transmitted/Absorbed Radiation.
- Unit 3: Flat Plate Collectors; Loss Coefficients, F, F', F", FR, QU Critical Radiation; Mean Temperatures; Liquid Heaters; Air Heaters.
- Unit 4: Collector Characterizations and Tests, Energy Storage, Solar Process Loads; System Analysis.
- Unit 5: Introduction to renewable and distributed energy generation Zero energy buildings, System Analysis and Computation, Solar system design and installation, Basic Economics, Life Cycle Economics, Concentrating Systems and Solar Chemistry.

COURSE OBJECTIVES

To introduce the student to the various solar thermal technologies that are used in domestic and industrial applications.

MAPPING OF COs with POs

Course Outcomes	Programme Outcomes (PO) (Enter Numbers only)

1. Apply the concept of environmental payback period / LCA on solar thermal system	**All POs are mapped**
2. Define the solar angles, radiation availability, optical properties of materials	
3. Use the instrument for radiation analysis, interpret data for analysis	
4. Design a thermal collector / thermal energy storage for a given load	
5. Apply interdisciplinary approach in solar thermal energy system	

COURSE PLAN – PART II

COURSE OVERVIEW

This course educates students in various solar thermal technologies that are used in domestic and industrial applications.

COURSE TEACHING AND LEARNING ACTIVITIES (Add more rows)

S.No.	Week/Contact Hours	Topic	Mode of Delivery
1	Week 1 to 4	Introduction to course, Solar systems, Introduction to Flat plate collectors, Solar Radiation: Definitions, Angles, Shading, and Extraterrestrial Radiation. Radiation Data & Processing.	Chalk & talk, ppt
2	Week 5 to 7	Energy and atmosphere issues in a global context. Radiation on Sloped Surfaces, Utilizability Concepts, Heat Transfer Topics, Radiation fundamentals, Spectral Radiation Properties, Transmitted/Absorbed Radiation.	Chalk & talk, ppt
3	8	Mid semester examination	Examination
4	Week 8 to 10	Flat Plate Collectors; Loss Coefficients, F, F', F", FR, Q_U Critical Radiation; Mean Temperatures; Liquid Heaters; Air Heaters.	Chalk & talk, ppt
5	Week 11 to 14	Collector Characterizations and Tests, Energy Storage, Solar Process Loads; System Analysis.	Chalk & talk, ppt

6	Week 15-17	Introduction to renewable and distributed energy generation Zero energy buildings, System Analysis and Computation, Solar system design and installation, Basic Economics, Life Cycle Economics, Concentrating Systems and Solar Chemistry.	Chalk & talk, ppt
7	Week 18	Semester Examination	Examination

COURSE ASSESSMENT METHODS (shall range from 4 to 6)

S.No.	Mode of Assessment	Week/Date	Duration	% Weightage
1	Project – Week 5th to 14th			
	Formulation of problem – reporting	5th	Aug 12-19th	10
	Methodology – submission	6th	Aug 19-26th	10
	Software handling/ Experimentation, Collection of data and analysis – Submission	13th	Aug 26th - Oct 17th	10
	Results – submission	14th	Oct 17th-21st	10
2	Mid semester examination	8th	90 minutes	30
CPA	Compensation Assessment*	17th	90 minutes	30
3	End semester examination	18th	90 minutes	30

***mandatory; refer to guidelines on page 5**

COURSE EXIT SURVEY (mention the ways in which the feedback about the course shall be assessed)

Feedback form will be collected from the students by week 17 with the help of class representative and submitted to the concerned authorities.

COURSE POLICY (including compensation assessment to be specified)

MODE OF CORRESPONDANCE (E-mail/phone)

Students can meet me in my office (DEE-Main, faculty room near-by DEE-Office) or contact me at latha@nitt.edu/ +91 9894600407.

COMPENSATION ASSESSMENT POLICY

Compensation assessment will be conducted only for students who miss in mid semester examination on valid/genuine reasons of medical or other emergencies.

ATTENDANCE POLICY (A uniform attendance policy as specified below shall be followed)

- At least 75% attendance in each course is mandatory.
- A maximum of 10% shall be allowed under On Duty (OD) category.
- Students with less than 65% of attendance shall be prevented from writing the final assessment and shall be awarded 'V' grade.

ACADEMIC DISHONESTY & PLAGIARISM

- Possessing a mobile phone, carrying bits of paper, talking to other students, copying from others during an assessment will be treated as punishable dishonesty.
- Zero mark to be awarded for the offenders. For copying from another student, both students get the same penalty of zero mark.
- The departmental disciplinary committee including the course faculty member, PAC chairperson and the HoD, as members shall verify the facts of the malpractice and award the punishment if the student is found guilty. The report shall be submitted to the Academic office.
- The above policy against academic dishonesty shall be applicable for all the programmes.

ADDITIONAL INFORMATION, IF ANY

Text Books and Reference

1. **1**'*Solar engineering of thermal processes'* - Second Edition, 1991, second printing, by Duffie and Beckman.

FOR APPROVAL

Course Faculty M. Ruckmani **CC- Chairperson** (A. ARUNAGIRI) **HOD** N. Arunachalam 2/8

Guidelines

a) The number of assessments for any theory course shall range from 4 to 6.

b) Every theory course shall have a final assessment on the entire syllabus with at least 30% weightage.

c) One compensation assessment for absentees in assessments (other than final assessment) is mandatory. Only genuine cases of absence shall be considered.

d) The passing minimum shall be as per the regulations.

B.Tech. Admitted in				P.G.
2018	2017	2016	2015	
35% or (Class average/2) whichever is greater.		(Peak/3) or (Class Average/2) whichever is lower		40%

e) Attendance policy and the policy on academic dishonesty & plagiarism by students are uniform for all the courses.

f) Absolute grading policy shall be incorporated if the number of students per course is less than 10.

g) Necessary care shall be taken to ensure that the course plan is reasonable and is objective.