DEPARTMENT OF PRODUCTION ENGINEERING
NATIONAL INSTITUTE OF TECHNOLOGY TIRUCHIRAPPALLI - 620 015

COURSE OUTLINE			
Course Title	**ADVANCES IN POLYMER MATRIX COMPOSITES**		
Course Code	**PR 612**	No. of Credits	**03**
Department	**PRODUCTION ENGINEERING**	FACULTY	**Dr. K.PANNEERSELVAM**
Pre-requisites Courses	-		
Course Coordinator(s) (IF APPLICABLE)	-		
Other course TEACHER(S) /TUTOR(S) Email	kps@nitt.edu	Telephone No	0431-2503515
Course Type	☐ Core Course	☑ Elective Course	

COURSE OVERVIEW

This course is to teach the advances in Polymeric Matrix Composite(PMC) in such a way that the students can understand and use it in practical applications.

This course gives (i)Overall view of composite materials, (ii)Faburication methods of Polymeric Matrix Composites(PMC), (iii)Characterization of PMC, (iv)Weldability studies of PMC, (v)Machinability studies of PMC, (vi) Application of PMCs and (vii)Environmental issue of PMC.

COURSE OBJECTIVES

1. Describe manufacturing and characterization of polymer matrix composites.
2. Perform joining & machining of polymer matrix composites.
3. Apply polymer composites for recent industrial applications & confront environmental issues.

COURSE OUTCOMES (CO)

COURSE OUTCOMES	Aligned Program Outcomes (PO)
Co1. Describe manufacturing and characterization of polymer matrix composites. Co2. Perform joining & machining of polymer matrix composites. Co3. Apply polymer composites for recent industrial applications & confront environmental issues.	

COURSE OUTCOMES	Program Outcomes (PO)										
	1	2	3	4	5	6	7	8	9	10	11
CO1	√	√	√	√	√	√	√	√			
CO2	√	√	√	√	√	√	√	√			
CO3	√	√	√	√	√	√	√	√	√	√	

PROGRAMME OUTCOMES (POs)

Sl. No	Attributes	Programme Outcomes (POs): On successful completion of the programme the students will be able to
1.	Scholarship of Knowledge	Acquire in depth knowledge in Manufacturing technology with an ability to define, evaluate, analysis and synthesize existing and new knowledge.
2.	Critical Thinking	Analyze problems critically; apply independent judgment for synthesizing information to make intellectual and/or creative advances for conducting research.
3.	Problem Solving	Conceptualize and solve Manufacturing engineering problems and evaluate optimal solutions considering economic and eco-friendly factors
4.	Research Skill	Develop scientific/ technological knowledge in Manufacturing engineering through literature survey and design of experiments.
5.	Usage of modern tools	Apply of IT tools such as CAD/CAE/CAM for modeling and simulation of complex Manufacturing processes.
6.	Collaborative and multi-disciplinary work	Perform collaborate multidisciplinary scientific Manufacturing engineering research through self-management and team work.
7.	Project Management and Finance	Demonstrate knowledge and understanding of Manufacturing engineering and management and apply the same to one's own work, as a member and leader in team, manage projects efficiently in respective disciplines and multidisciplinary environments after consideration of economic and financial factors.
8.	Communication	Communicate with the engineering community, and with society at large, regarding complex engineering activities confidently and effectively, such as, being able to comprehend and write effective reports and design documentation by adhering to appropriate standards, make effective presentations, and give and receive clear instructions.
9.	Life-long Learning	Recognize the need for, and have the preparation and ability to engage in life-long learning independently, with a high level of enthusiasm and commitment to improve knowledge and competence continuously.
10.	Ethical Practices and Social Responsibility	Acquire professional and intellectual integrity, professional code of conduct, ethics of research and scholarship, consideration of the impact of research outcomes on professional practices and an understanding of responsibility to contribute to the community for sustainable development of society.
11.	Independent and Reflective Learning	Observe and examine critically the outcomes of one's actions and make corrective measures subsequently and learn from mistakes without depending on external feedback.

COURSE TEACHING AND LEARNING ACTIVITIES

S.No	Week	Topic	Mode of Delivery
1.	Week :1	• **Course plan details** Polymer matrix – classification - thermoplastics and thermosetting plastics, types of matrix material, reinforcement material-fiber-particulate-whisker, properties of reinforcements and matrix.	C&T / PPT / Video/ Simulation
2.	Week : 2	Composite material-Types- MMC – PMC - CMC, Advantages and Disadvantages.	
3.	Week :3	Manufacturing of PMC material –Layup, Autoclave Molding filament Winding, Pultrusion, etc..	
4.	Week :4	Forming methods for Polymers and polymeric composite material - component design consideration	
5.	Week :5	**Assignment -1 and QUIZ-1 through Moodle Plat form**	
6.	Week :6	Joining of PMC-Friction Welding of PMC, Thermal Welding of PMC, Electromagnetic Welding of PMC-Process-Processing Parameters-Materials -Advantages & Disadvantages and Applications.	C&T / PPT / Video/ Simulation
7.	Week :7	Mechanical fastening of PMC, Chemical bonding of PMC, Joint design, equipment and application methods, Advantages and disadvantages, Applications adhesive bonding	
8.	Week : 8	Machinability study on PMC(turning milling drilling etc..), and study on it performance characteristics like delamination's, force, torques	
9.	Week : 9	Application of Polymers and PMC material -Automotive Industry-Marine Industry-Materials Handling-Chemical Industry-Electrical & Electronics Industry-Aerospace Industry-Biomedical field.	
10.	Week :10	**Assignment -2 and QUIZ-2 through Moodle Plat form**	
11.	Week : 11	Recent advancements in polymeric materials -Blends and composites-conducting polymer -nanofibers-Polymeric nanocomposites	C&T / PPT / Video/ Simulation
12.	Week : 12	Biodegradable Polymeric , Polymer in health care, Environmental issues concerning polymers and polymer in energy application.	
13.	Week : 13	**Assignment -3 and QUIZ-3 through Moodle Plat form**	
14.	Week : 14	**Assignment -4* and QUIZ-4* through Moodle Plat form**	
15.	Week : 15	**Semester Examination**	

C & T : Chalk and Talk PPT : Power Point

COURSE ASSESSMENT METHODS

S.No.	MODE OF ASSESSMENT	WEEK/DATE	DURATION	% WEIGHTAGE
1.	Assignment -1	Week:5		10
2.	QUIZ-1	Week:5	60 Minutes	10
3.	Assignment -2	Week:10		10
4.	QUIZ-2	Week:10	60 Minutes	10
5.	Assignment -3	Week:13		10
6.	QUIZ-3	Week:13	60 Minutes	10
7.	SEMESTER EXAMINATION	Week:15	120 Minutes	40

Important Note:

1. Attending all the assessments are MANDATORY for every student.
2. *If any student is not able to attend any one of the course assessment between Sl No. 1 to 3 due to genuine reason, that student is permitted to attend **compensation assessment** with approval of course faculty. Compensation assessment will be conducted after completion of QUIZ-3 only. During compensation assessment, students have to submit answers for list of assignment questions given by the course faculty and then students should appear for written exam of 2 hours duration for 100 marks with 20 % weightage for the FULL syllabus of PR612- Advances in Polymer Matrix Composites.
3. In any case, compensation assessment will not be considered as an improvement test.
4. Student, who have not appeared for all the assessment (from Sl No. 1 to 3 as given in the course assessment methods)/ compensation assessment is not eligible for Semester Examination and those students has to RE-DO the course.

ESSANTIAL READINGS

References:

1. Mein Schwartz., "Composite Materials Handbook", McGraw Hill, 1984
2. "ASM Hand book on Composites", Volume 21, 2001
3. "Handbook of Plastics Joining-A Practical Guide",Plastics Design Library, 13 Eaton Avenue, Norwich, New York 13815.
4. Leonard Hollaway "Handbook of Polymer Composites for Engineers", British Plastics Federation.
5. Edward Arnold, "Process Selection from design to manufacture", 1997.

COURSE EXIT SURVEY

Mention the ways in which the feedback about the course is assessed and indicate the attainment also:

- Feedback from the students during class committee meetings
- Anonymous feedback through questionnaire (Mid of the semester & End of the semester)
- End semester feedback on Course Outcomes

CORRESPONDENCE

1. All the students are advised to check their NITT WEBMAIL regularly. All the correspondence (schedule of classes schedule of assessment course material any other information regarding this course) will be done through their webmail only.
2. Queries (if required) may be emailed to me / contact me during 4.00 pm to 5.00 pm on Monday and Friday with prior intimation for any clarifications.

ATTENDANCE

Attendance will be taken by the courese faculty in all the contact hours.

ACADEMIC HONESTY & PLAGIARISM

Copying in any form during assessments is considered as academic dishonesty and will attract suitable penalty.

ADDITIONAL COURSE INFORMATION

The faculty is available for consultation at times as per the intimation given by the faculty.
Queries may also be emailed to the Course Faculty directly at kps@nitt.edu

FOR APPROVAL

Course Faculty **CC Chairperson** **HOD**