COURSE ID SHEET

Course No.	5147	NTUA

Semester:	6	Core	X	Elective		Specialization	

TITLE: **Polymer Engineering**

AIM

The aim of the course is to introduce the students to the Science and Technology of Polymers and to understand the basic concepts that govern the production and processing of these materials. Initially the polymerization processes that enable the synthesis and production of polymers are analyzed. Following is the presentation of critical physicochemical properties of polymers in solid state, in melt and in solution, with the aim to construct and optimize structure-properties relationships. Finally, there is an overview of the basic polymer processing/molding techniques that lead to the production of shaped plastic articles.

CONTENT

- **INTRODUCTION:** Basic concepts - classification of polymers. Molecular weight and distribution. Classification of polymerization reactions and mechanisms.
- **POLYMERIZATION PROCESSES**: Chemistry – kinetics of linear step growth polymerization mechanism. Chemistry– kinetics of chain growth polymerization reactions. Copolymerization. Polymerization techniques.
- **STRUCTURE AND POLYMER THERMAL TRANSITIONS**: Thermoplastics, thermosets, elastomers. Crystalline and amorphous state. Glass transition and melting points.
- **MECHANICAL PROPERTIES:** Introduction to viscoelasticity.
- **POLYMER SOLUTIONS AND MELTS**: Rheological behavior.
- **BASIC POLYMER PROCESSING TECHNIQUES:** Equipment, operational process parameters.

HOURS PER SEMESTER

LECTURES	**39**	EXERCISES	-	LABORA-TORY	-	HOME-WORK	**51**	**TOTAL HOURS: 90**

STUDENT PERFORMANCE/ EVALUATION

The evaluation of the students will be done through

- A final (written) Examination (FE) using books and notes.
- An optional Team Project (TP)

The final grade results as follows:

- **With Team Project: Final Grade = 0.7 x (FE) + 0.3 x (TP)**
- **Without Team Project: Final Grade = FE**