《高分子材料及应用》（双语）（教学大纲）

**一、课程基本信息**

课程名称（中、英文）：《高分子材料及应用》（双语）

Polymeric Materials and Their Applications

课程号（代码）：300055020

课程类别：专业必修课

学时：32 学分：2

1. **教学目的及要求**

对毕业要求及分指标点的支撑情况

1. 毕业要求2，分指标点2.2,；
2. 毕业要求3，分指标点3.4；
3. 毕业要求6，分指标点6.3**。**

**1. Prerequisites（前期课程）:** Polymer Physics and Polymer Chemistry

**2. Course object（课程对象）：**This course is intended for the third year undergraduate students majored in Polymer Science and Materials, who has the fundamental knowledge in polymer physics and polymer chemistry. Students from other majors who have met the prerequisites can also attend this course.

**3. Course description（课程概况）：**The Course “Polymeric Materials and Application” provides the students with a grasp of the basic properties and appropriate usages associated with each polymer type. Polymeric materials are available in a wide variety, and each type has characteristics that will be presented in a concise manner. Brief summaries of the methods of processing polymeric materials are also discussed and exemplified by photographs.

Upon successful completion of this course, the student should be able to differentiate polymer types according to their specific characteristics and to select polymer materials for specific applications. Inaddition, the student should be able to identify properties and characteristics of each polymeric material. Finally the student should know the basic principles and methods for processing polymeric materials.

**4. Overall course Objectives（教学目的）：**

(1) Develop an understanding of the different types of polymeric materials, along with their benefits and limitations in use.

(2) Learn about the polymer chemistry for each type of polymer.

(3) Understand how polymers are manufactured and how structure may affect properties.

(4) Gain basic knowledge about designs of polymeric products.

(5) Use polymer terminology correctly.

(6)Describe the impact of production processes and selection of components on product performanceand cost.

(7)Know the future development in polymeric materials.

**三、教学内容（含各章节主要内容、学时分配）**

Contents of course（教学内容）

1 Introduction to polymeric materials （2 hrs）

a. What is polymer?

1. Brief history to polymeric materials
2. Polymeric materials in every day life
3. Classification of polymeric materials.

2 Plastics （12hrs）

a. Introduction

b. The properties and classes of plastics

d. Thermoplastics

e. Thermosetting plastics

f. Fiber-reinforced thermoplastics

g. Applications of plastics

3 Elastomers （6hrs）

a. Introduction

b. The nature of elastomers

c. Thermoplastic elastomers

d. Thermoset elastomers

4 Organic fibers （6hrs）

a. Introduction

b. Structure and properties of fibers

c. Processing methods for synthetic fibers

d. Applications and markets for fibers

5 Adhesives and Coatings (4 hrs)

a. Introduction

b. Adhesives

c. Coatings

d. Markets for adhesives and coatings

6 Functional polymeric materials (4 hrs)

**四、教材 (Textbook)**

No proper English and Chinese textbook is available for this course up to now. We have compiled a textbook specially designed to this course. English version of the textbook was completed in the end of 2003. The corresponding Chinese version will be written based on the English version. The English version is used as the textbook and the Chinese version as a reference. Both English and Chinese version will be published.

**五、References (主要参考资料)**

1. Giant Molecules, CE Carraher, John Wiley and Sons, 2003.

2. Introduction to Polymers, R.J.Young and P.A.Lovell

3. Fundamentals of Polymer Science, P. Painter and M. Coleman

4. The Physics of Polymers, 2nd Edition, G. Strobl

5. Handbook of Plastics, Elastomers, and Composites, 3rd ed. C. A. Harper

6. 高分子材料基础，张留成等，化学工业出版社, 2002

7. 塑料材料的选用，王文广，化学工业出版社, 2001

**六、Class organization and grading (授课形式及成绩评定)**

**1. Class Organization（授课形式）**

We try to establish a new lecturing style for the course Polymeric Materials and Applications. Instead of lecturing at students for a class period, the faculty uses a collaborative lecturing. The classrooms are places where the students are actively involved in the lecturing process. As a part of development, the multimedia methods are introduced, which are useful for collaborative lecturing. The faculty should prepare PowerPoint slides, VCR cassettes for some contents, and photographs as examples. The students should participate in two class discussions and one case study. They are also required to complete one term paper in the end of semester.

**2. Grades （评分标准）**

50 % final exam.

15 % case study and term paper.

30 % class test and exercises.

5 % class performance.