Information Form for SJTU Graduate Profession Courses

Basic Information					
* Course Name	Chinese				
	English Smart Polymeric Materials and Applications				
* Credits	2	* Teaching Hours	32 1 =16		
* Semester	Fall	* Cross-semester?	No	Spanning over Semesters	
* Course Type	Elective Course	* Course Type	For full-time students		
* Course Category	Specialized Course	Targeting Students	All graduates		
* Instruction Language	English	Teaching Method	In class teaching		
* Grade	Letter grading	Exam Method	Written Exam		
* School					
Subject					
Person in charge	Name	ID	School	E-mail	
				clfeng@sjtu.edu.cn	
Extended Information					
* ( ) Course Description	200				
* English Course Description	This intelligent synthetic material with field response ability is the most exciting and interesting new research field, and it is also a new commercial field that has not been developed yet. Although there will be many challenges in this field, polymer materials show great potential in the development of intelligent polymer materials in the future due to their structural designability. Therefore, aiming at the hot resea□ 9 of this kind of materials, polymer systems with elopment trend, etc. In order to enable students understanding of the preparation, modification polymer synthesis, and prepare for the future talents in this field.				

* ( ) Syllabus	2 2 4 2 2 4 2 4 2 2 2 2 2
* English Syllabus	**Contents** *(The time for group discussion and presentation is included in the duration for each unit)* **1 Introduction: Recent advances and challenges in designing stimuli-responsive polymers** Synthetic materials capable of responses to external or internal stimuli represent one of the most exciting and emerging areas of scientific interest and unexplored commercial applications. While there are many exciting challenges facing this field, there are a number of opportunities in design, synthesis, and engineering of stimuli-responsive polymeric systems and Mother Nature serves as a supplier of endless inspirations. One 1.5 h classes **2 Stimuli-responsive molecular brushes** The course focuses on the general aspects of molecular brushes and polymeric responsive systems. Rational approaches to induce stimuli-responsiveness in molecular brush systems are highlighted. One 1.5 h classes **3 Stimuli-responsive amphiphilic (co)polymers via RAFT polymerization** The course focuses specifically on advances in the synthesis of (co)polymers from water-soluble monomers yielding stimuli-responsive systems. Additionally, we focus on recent reports of assembly into micelles and polymersomes induced by external stimuli including temperature, pH, and ionic strength. Reversible cross-linking methods to ″ lock ″ such assembled morphologies are addressed as well as potential applications in nanomedicine. Two 1.5 h classes **4 Stimulus-responsive polymer brushes on surfaces: Transduction mechanisms and applications**

This course summarizes selected, recent progress in SRPB applications in the field of surface wettability switching, mechanical actuation, and environmental sensing.Furthermore,wereview selected papers from an emerging area in which SRPBs are used for nano- and microfabrication.
one 1.5 h classes

5 Cathodic electrografting of acrylics: From fundamentals to functional coatings
This remarkable progress that largely relies on advanced controlled polymerization processes will be focused, with a special emphasis on the more recent development of smart coatings, particularly stimuli responsive coatings very well-suited to nanotechnologies.
One 1.5 h classes

6 Stimuli-responsive monolayers for biotechnology
This course focus on recent advances in stimuli-responsive materials specifically focusing on monolayers formed by molecules such as peptides and oligonucleotides and their applications in biotechnology.
Two 1.5 h classes

7 Stimuli-responsive nanoparticles, nanogels and capsules for integrated multifunctional intelligent systems
The course consists of two major parts: synthesis and applications of nanoparticles in colloidal dispersions, thin films, delivery devices and sensors. We also broadly discuss potential directions for further developments of this research area.
One 1.5 h classes

8 Biomimetic mechanically adaptive nanocomposites
This course focuses the development of a new family of artificial polymer nanocomposites that mimic the architecture and the mechanic adaptability of the sea cucumber dermis.
Two 1.5 h classes

9 The world of smart healable materials
This course will present a comprehensive view of the field of stimuli-responsive healable materials.
One 1.5 h classes

10 Biomolecular motors at the intersection of nanotechnology and polymer science
This course focuses on the contributions involving the use of linear biomolec

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* English Requirements	1. Normal attendance rate of all courses 2. For intelligent polymer materials, complete at least one classroom ppt Report 3. Writing at least two times reports for smart polymeric materials 4. Pass final exam
* Resources	1. Liu F, Urban MW, *Recent advances and challenges in designing stimuli-responsive polymers*, Prog. Polym. Sci. **2010**; 35; 3-23. 2. UrbanMW. *Stratification, stimuli-responsiveness, self-healing, and signaling in polymer networks*. Prog Polym Sci **2009**;34:679–87. 3. Urban MW, Lestage DJ. *Colloidal particle morphology and film formation, the role of bio-active components on stimuli-responsive behavior*. Polym Rev **2006**;46:445–66. 4. Saha K, Pollock JF, Schaffer DV, Healy KE. *Designing synthetic materials to control stem cell phenotype.* Curr Opin Chem Biol **2007**;11:381–7. 5. Urban MW. *Intelligent polymeric coatings, current and future advances.* Polym Rev **2006**;46:329–39. 6. Kamath KP, Park K. *Biodegradable hydrogels in drug delivery.* Adv Drug Deliv Rev **1993**;11:59–84.
* English Resources	1. Liu F, Urban MW, *Recent advances and challenges in designing stimuli-responsive polymers*, Prog. Polym. Sci. **2010**; 35; 3-23. 2. UrbanMW. *Stratification, stimuli-responsiveness, self-healing, and signaling in polymer networks*. Prog Polym Sci **2009**;34:679–87. 3. Urban MW, Lestage DJ. *Colloidal particle morphology and film formation, the role of bio-active components on stimuli-responsive behavior*. Polym Rev **2006**;46:445–66. 4. Saha K, Pollock JF, Schaffer DV, Healy KE. *Designing synthetic materials to control stem cell phenotype.* Curr Opin Chem Biol **2007**;11:381–7. 5. Urban MW. *Intelligent polymeric coatings, current and future advances.* Polym Rev **2006**;46:329–39. 6. Kamath KP, Park K. *Biodegradable hydrogels in drug delivery.* Adv Drug Deliv Rev **1993**;11:59–84.
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