

* Course Name	Chinese			
	English Multi-Principal Element Metallic Materials--Bulk Metallic Glasses & High-Entropy Alloys			
* Credits	2	* Teaching Hours	32	
* Semester	Fall	* Cross-semester?	No	Spanning over Semesters
* Course Type	Program Elective Course	* Course Type	For full-time students	
* Course Category	Specialized Course	Targeting Students	All graduates	
* Instruction Language	Chinese	Teaching Method	In class teaching	
* Grade	Letter grading	Exam Method	Essay	
* School	School of Materials Science and Engineering			
Subject	Materials Science and Engineering			
Person in charge	Name	ID	School	E-mail
	LI Jinifu		School of Materials Science and Engineering	jfli@sjtu.edu.cn
* () Course Description	200			
* English Course Description	<p>The emergence of bulk metallic glasses and high-entropy alloys breaks through the limitation of conventional metallic materials consisting of only one or two principal components. The significant increase in the number of principal components breeds a strong chemical disorder effect, a significant sluggish diffusion effect and a severe lattice distortion effect, so that the materials exhibit special structural characteristics, phase transition behaviors and physical and chemical properties, which constitute the most advanced part of metallic materials research. This course focuses on the structure, composition design theory, performance behavior and typical applications of bulk metallic glasses and high-entropy alloys, reflecting the latest research achievements in the field. The course is designed for graduate students who have taken undergraduate courses “Fundamentals of Materials Science”, “Fundamentals of Material Processing” and “Properties of Materials.</p>			

* () Syllabus				
* English Syllabus	Content		Hours	Format
			2	In class teaching
	Formation of multi-principal element alloys	1.1 Thermodynamics of multi-principal element alloys	2	In class teaching
		1.2 Kinetics of multi-principal element alloy formation	2	In class teaching
	Bulk metallic glasses	2.1 Structure of bulk metallic glasses	4	In class teaching
		2.2 Composition design of bulk metallic glasses	2	In class teaching
		2.3 Properties of bulk metallic glasses	4	In class teaching
		2.4 Strengthening and toughening of bulk metallic glasses	4	In class teaching
	High-entropy alloys	3.1 Compositions and structures of high-entropy alloys	4	In class teaching
		3.2 Mechanical properties of high-entropy alloys	4	In class teaching
3.3 Strengthening and toughening of high-entropy alloys		4	In class teaching	
* Requirements	50			

* English Requirements	Exam method: essay plus oral exam. Through the course study, the students should master the composition design theory, structure and properties, and typical applications of bulk metallic glasses and high-entropy alloys, so that their understanding of metallic materials could be greatly deepened.
* Resources	
* English Resources	(1) Bulk Amorphous Alloys, edited by HUI Xidong and CHEN Guoliang, Beijing: Chemical Industry Press, 2007 (in Chinese). (2) High-Entropy Alloys--Fundamentals and Applications, edited by Michael C. Gao, Jien-Wei Yeh, Peter K. Liaw and Yong Zhang, Switzerland: Springer International Publishing, 2016
Note	