Thermodynamics and statistical thermodynamics are used to study the material problem and the thermodynamics of appellation material. It is based on dynamics, crystallography, solid state physics and solid chemistry. Materials engineering includes materials design, manufacturing, molding and inspection. It is a comprehensive discipline that applies material science principles to design and process materials and combined with material science and engineering as a complete part.

The application of thermodynamics in this field plays an active role in developing varieties of materials and improving the quality of materials. The application of material thermodynamics principle can clarify and predict phase diagrams, phase transitions and other physical phenomena of materials. Material thermodynamics not only grasps the basic knowledge of thermodynamics, but also applies these principles and methods to material practice. We should grasp the basic concepts, principles and methods of thermodynamics, understand the rules of phase diagram and interpret phase diagrams.

The advanced thermodynamics is based on the material thermodynamics and physical chemistry courses which have be mastered in the undergraduate level. This course requires combs the course content, and makes a good connection between the teaching content and teaching depth. The students need to master higher level in learning content, grasp the thermodynamics principles of phase transformation, phase diagram, interface, statistics, irreversible process and so on. Be familiar with and grasp the application of the basic principles of thermodynamics in material design and processing, and apply it to practice.

	Introduction	2	Lecture	X Jin & W Li
	Review and fundamentals of thermodynamics	6	Lecture/exercises	X Jin & W Li
	Calculations of free energy, solutions and thermodynamics of phase diagram	8	Lecture	X Jin & W Li
	Practice of TC software	4	Computational lab	X Jin & W Li
	Thermodynamics of phase transformation	8	Lecture	X Jin & W Li
	Thermodynamics of interfaces	6	Lecture	X Jin & W Li
	Statistics of thermodynamics	6	Lecture	X Jin & W Li
	Thermodynamics of irreversible processes	2	Lecture	X Jin & W Li
	Group assignments	4	Presentation	X Jin & W Li
	Final exam	2	At class	X Jin & W Li

	20% 30% 50%
	Regular grade 20% Exam grade 30% Curriculum project 50%
	David V. Ragone, Thermodynamics of Materials, John Wiley & Sons, 1995 Nishizawa T , 2006 2010
	David V. Ragone, Thermodynamics of Materials, John Wiley & Sons, 1995 Nishizawa T, Thermodynamics of microstructure,translated by Hao Shiming, Chemical industry press,2006 Xu Zuyao, material thermodynamics, higher education press, 2010