Please consider the following new course for inclusion in the Spring 2021 schedule:

MATS 413 THERMODYNAMICS AND PHASE EQUILIBRIA OF MATERIALS
4 CREDITS (3 LECTURE HOURS + 1 DISCUSSION HOUR)

Instructor: Melissa K. Santala

This lecture course will cover the principles of thermodynamics governing phase stability with a focus on liquid-solid and solid-solid equilibria, including phase stability in two-component systems. Coverage will include heat capacity in condensed phases and its relationship to both enthalpy and the statistical interpretation of entropy. Understanding of the Gibbs free energy as a criterion for phase stability will be a key element of this course.

This course is intended to provide the necessary conceptual knowledge of thermodynamics for materials science bridging basic introductory courses (MATS 321 and MATS 322) with more advanced materials courses, such as MATS 445 Welding Metallurgy, MATS 455 Experimental Techniques in Materials Science, MATS 478 Thin Film Materials Characterization and Properties, MATS 441 Physical Metallurgy. There is very little overlap with existing ME courses, MATS courses, or courses offered in other departments at the university.

This course has some overlap with CHE 312, but it is differentiated in having more intensive coverage of two-component phase equilibria, having coverage of three-component phase equilibria, and coverage of surface and interfacial energy. In addition, CHE 312 focuses on vapor-liquid systems, as opposed to solid-solid, liquid-solid, which will be a major part of this course.

This course had been offered once as a MATS 499 course in Fall 2018.

With regard to scheduling, this course should not conflict with the undergraduate materials science courses MATS 321, MATS 322, MATS 441, ME 445, MATS 478, and MATS 455.