

Work program for the problem solving classes, Soft Matter Physics HT07

This is a tentative work program. If any of you have requests or want to focus on something you find interesting or difficult please let me know!

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RJ: Richard Jones: *Soft Condensed Matter*.

RQ: List of review questions.

Time	Subject	Problems during class	Recommended home problems
18/9 13:15	Concepts, phase transitions and glasses	RJ 2.2, 2.7, 3.1, 3.5 RQ 6 Extra problem glasses. If time allows: 2.8	RJ 2.1, 2.3, 2.8 RQ 8, 9, 11, 12
27/9 08:00	Polymers and colloids	RJ 4.5, 5.4, 5.5 RQ 30	RJ 5.1, 5.2 RQ 24
16/10 13:15	Gels, liquid crystals and smp in biology	RJ 6.1, 9.1, 9.2, 10.1 Extra problem RQ 42	RJ 9.3, 9.4, 7.1, RQ 33, 39

Extra problem - glasses:

1. Based on the basic assumptions of the free volume theory show that the typical Vogel-Fulcher behaviour for the viscosity is obtained assuming a simple relation between the free volume and the viscosity:

$$\eta = a \exp\left(\frac{bv}{v_f}\right)$$

where v_f/v is the fractional free volume.

Extra problem – self assembly:

Derive the limits for formation of spherical and cylindrical micelles respectively of amphiphilic molecules in terms of characteristics of the molecule.