1. **Knowledge**: what you need to know.

   (a) Terminology: equal sets, subsets, cardinality of a finite set, power set of a set, cartesian products, disjoint sets, generalized unions and intersections.

   (b) Definitions: union, intersection, and difference of two sets, complement of a set.

   (c) Terminology: relations, functions, domain, codomain, image of an element, image of a subset, range, graph of a function.

   (d) Definitions: pre image of a subset, one-to-one function, onto function, one-to-one correspondence.

   (e) Definitions of (binary) relation between two sets, relation on a set, reflexive, symmetric, antisymmetric, transitive, equivalence relation.

   (f) Terminology: equivalence class of an element, $\mathbb{Z}_n$.

2. **Techniques/Applications**: what you need to be able to do.

   (a) Listing elements of sets, recognizing when a set is a subset of another set, determine the power set of a set, describe sets defined as cartesian products.

   (b) Determine the cardinality of a given set.

   (c) Prove basic identities of sets (table 1 Sec. 2.2), show identities of sets by using basic identities.

   (d) Prove inclusions between sets.

   (e) Determine the elements in a combination of sets.

   (f) Draw Venn diagrams of combinations of 2 or 3 sets.

   (g) Determine domain and codomain of a function, image of an element, image of a subset, range of a function, pre-image of a subset.

   (h) Determine whether a function is one-to-one, onto, one-to-one correspondence.

   (i) Prove/Disprove that a given function is one-to-one, onto or a one-to-one correspondence.

   (j) Prove statements by using induction and strong induction.

   (k) Determine whether a relation is symmetric, reflexive, antisymmetric, transitive.

   (l) Write the matrix / draw the graph associated to a relation on a set.

   (m) Determine whether a relation is an equivalence relation, determine the equivalence class of an element, determine the equivalence classes of an equivalence relation. Determine whether a collection of subsets is an equivalence relation. Describe a partition as an equivalence relation.