GC 120 Final Exam Study Guide

Chapter 1

Standards and Conventions

- Conventions – commonly accepted practices, rules, or methods
- Standards – are sets of rules that govern how technical drawings are represented
- Precedence of lines – a convention describing the order of priority of different linestyles. For example, if a visible and hidden line coincide, the visible line is the one drawn
- Alphabet of lines – is a set of ASME standard linetypes for technical drawing
- Types of sketches
    - Square and isometric grids are used to draw things from different perspectives
    - Multiview – 3 views (top, front, profile)
    - Axonomoetric – isometric
    - Oblique – like isometric but more centered on front
    - Perspective – like isometric but more centered on profile

Concurrent Engineering Design Process

- All parts to this produce a model, between each stage there is a lot of sketching
- 3 Main Parts to this:
    - Ideation
        - Problem identification
        - Preliminary ideas
        - Preliminary design
    - Refinement
        - Modeling
        - Design analysis
        - Design visualization
        - Manufacturing simulation
    - Implementation
        - Servicing
        - Financing
        - Marketing
        - Producing
        - Planning
        - Documenting

Chapter 2

Processes that occur in a manufacturing business

- Technical sketching, visualization (using SolidWorks or your brain)

- 3D to 2D → projection

Chapter 3

Coordinate systems – how we view the points in space (Cartesian coordinate system, polar coordinate system, cylindrical, spherical, etc.)
Geometric fundamentals (elements) – points, lines, surfaces, solids

Chapter 4

Constraints – mathematical requirement placed on geometric elements in a 3-D model

- Dimensional constraints – the distance between two geometric elements
- Geometric constraints – a relationship such as parallelism or perpendicularity between elements
- Explicit constraint vs. implicit constraint
    - Explicit is when the operator (me) says "I want this to happen" but then the program places the constraint implicitly

Sweeping operations – say we're extruding something, if we wanted it to become oblique we would "sweep" the object in one direction at a certain angle with the horizontal plane
Global coordinate system – based on an origin point, we can define every point in space in relation to that (e.g. (x,y,z))
Local coordinate system – based on a relative location, e.g. 20 degrees north, 40 degrees west
Parent-child relationship – describes the relationship between features in a model. The parent is created first and the child feature is dependent on the parent feature for its definition in some way.
Degrees of freedom – a feature's dependence on other features in a model
Manifold model – unambiguous difference between "inside" and "outside" of model

Chapter 5

Third-angle vs. First-angle projections – third-angle is T, F, RS (what we use in class); first-angle is RS, F, T
Perspective – distance from viewer and size (most realistic), skews model according to how its viewed
Parallel – does not skew model, keeps relative sizes intact (like models in SolidWorks)
Orthographic projection is a parallel projection technique in which the plane of projection is positioned between the observer and the object, and is perpendicular to the parallel lines of sight. Orthographic projection techniques can be used to produce both pictorial and multiview drawings.
Multiview projection is an orthographic projection for which the object is behind the plane of projection, and is oriented so only two of its dimensions are shown. Generally three views of an object are drawn, and the features and dimensions in each view accurately represent those of the object. (the T, F, RS thing)

Chapter 7

Axonometic Projection – parallel projection technique used to create a pictorial drawing of an object by rotating the object on an axis relative to a projection, or picture plane
Oblique Projection – Skewed projection so looks like isometric but 1D
Perspective Projection – lines of sites converge in distance
Multiview Projection – parallel lines of site to picture plane (normal F view)
Isometric Line – any line parallel to one of the legs of the isometric axis
Isometric Projection vs Isometric Drawing

- projection is when the sketch is not to full size
- drawing is when the object is full size

Chapter 8

Section view – are important because they are used to improve clarity and reveal interior features of parts and structures
Arrowheads – tell us which direction we'll keep of the drawing and represent the cutting lines
Cutting plane lines – tell us which plane we'll cut along and arrows give direction we keep
Types of Section Views

- full section, standard section view passing plane fully through object
- half section, cut away part of the object but not all of it
- broken out section, breaks away part of object with jagged edge
- revolved section, revolves the given cross section 90 degrees and keeps that but removes the rest
- removed sections, like revolved but ONLY shows part revolved

Chapter 9

Dimension line – a thin, solid line that shows the extent and direction of a dimension, broken for insertion of numbers
Extension line – thin, solid line perpendicular to dimension line, indicating which feature is associated with the dimension
Leader line – thing, solid line used to indicated the feature with which a dimension is associated (like when defining diameters)
Contour dimensioning – the contours or shapes of the object are dimensioned in their most descriptive view -- using multiple dimension line / extension line setups

Chapter 10

Working assembly drawing – combines no a single sheet the detail drawing and assembly drawing, usually a section view

Chapter 11

Aesthetic design – concerned with the look and feel of a product; affects consumerism
Functional analysis and design – a design driven by the *intended use* of the product; aesthetic considerations play a role in this
Product manager – person who has the ultimate responsibility for a design and its team
Concurrent Engineering design – see ch 1 notes

- different from linear in that you can go back and revise parts while still working on another