History? of the Universe
(according to Zelik,Gregory,Smith text book "Astronomy & Astrophysics"):

1. 10^{-45} sec: We have no real understanding of what physics would be like at the energies prevailing before this time. Probably, the gravitational force was quantized, and there may have been extra dimensions beyond the four that we experience as spacetime. It may be that the perturbations that would eventually became galaxies had their origins in quantum fluctuations right at the beginning when gravity was quantized.
2. 10^{-35} sec: This marked the end of Grand Unification. The strong nuclear force separated from the electroweak force, thereby initiating inflation. Before this epoch the numbers of quarks (and anti-quarks) and photons were equal, but a variety of processes that violated charge conjugation and parity resulted in the annihilation of most of the quarks. Since the current ratio of the number of photons to the number of baryons (made out of quarks) is 10^{9-10}, only about 1 in one billion quarks survived this period of annihilation. No antiquarks survived. This is the origin of the baryon/antibaryon asymmetry and is also the reason why baryons are so rare compared to photons.
3. 10^{-32} sec: Inflation ended. The "bubble" of phase that is our observable Universe had grown from about 10^{-23} cm to perhaps 10 cm, which would subsequently expand to much larger than we can presently see (about 10^{28} cm). The principal components of the Universe were photons, quarks, antiquarks, and colored gluons. Note that protons were not stable, so at this stage there were no elements, not even hydrogen.
4. 10^{-12} sec: The weak nuclear and electromagnetic forces separated. Notice that the Universe at this point was 10^{20} times older than when the last major event happened. Very little activity occurred in this period, and it is often referred to as a "dessert".
5. 10^{2-3} sec: This was the period of cosmic nucleosynthesis. Nucleons were fused, leaving about 25% of the baryonic matter in the Universe in the form of helium. Essentially all the rest of the baryons were hydrogen nuclei.
6. 10^{11} sec: This marked the era of decoupling between photons and baryons. Before this point, the energy density of radiation was much higher than that of the matter. After this, the matter dominated. Since the decoupling accompanied the combination of free electrons with nuclei, this marked the beginning of atoms, the form of matter that we are most familiar with.
7. 10^{16} sec: Galaxies, stars, and planets began to form.
8. 10^{18} sec: The present. As time passes from this stage, the galaxies continue to recede from each other, but the Hubble "constant" decreases. The temperature of the Universe will continue to drop, asymptotically approaching absolute zero. Since $\Omega = 1$, the expansion will continue for an indefinite period of time.
9. 10^{40} sec: Protons decay (perhaps). Atomic matter ceases to exist.

Equations:

Hubble's constant:

$$v = Hz$$

Hubble's constant is H, z is the separation of two objects (e.g. distant galaxies), and v is their relative velocity. H(in units of c per light year) = H (in units of km/s per million light years) divided by $3.0 \times 10^5 \cdot 10^6$.

Age of the universe in terms of Hubble's constant:

$$T = \frac{1}{H}$$

If H is in units of c per light year, T will be the age in years. This assumes the galaxies are coasting so it is only approximate.

Assorted facts and terms:

1. There does not appear to be a "critical" mass density in the universe. There is not enough mass to reverse the expansion into the big crunch.
2. There is apparently "dark matter" in the galaxies, non-luminous matter necessary to explain the rotation of outer galactic regions. However, there is not so much missing mass to recollapse the universe.

Evolutionary Stages of Stars

Small Stars Become brown dwarfs, not particularly bright or dramatic.

Medium Mass Stars: These are stars like our sun, less than 1.4 solar masses.

1. Combines hydrogen into helium.
2. Runs out of hydrogen inside, and flares into red giant.
3. Collapses into white dwarf.

Massive Stars: These are stars with masses greater than 1.4 solar masses.

1. Combines hydrogen into helium.
2. Combines light elements into iron.
3. Collapses (sometimes explodes as a supernova) into a neutron star.

Extremely massive Stars: These are very massive stars, the cutoff is not exactly understood.

1. Same as a massive star.
2. Collapses to a black hole.

Assorted Facts:

1. A white dwarf is a star that is held up by the pressure of its electrons. Due to the Pauli principle, electrons can not all have zero momentum at zero temperature, so they exert a pressure. They are much smaller than the previous stages of the star.
2. The Chandrasekhar limit is the limiting mass for a star to be a white dwarf, held up by electron pressure. It is 1.4 solar masses.
3. A neutron star is a star that has collapsed to neutron matter, a form of nuclear matter without protons. The protons and electrons in a normal star have converted via the reaction $p+e \to n+\nu$.
4. A black hole is a star that is so massive it can not even be held up by the pressure of nuclear matter, and collapses to a point. Even light is trapped in the interior.