

Interstellar Medium --- Syllabus

Graduate Institute of Astronomy Fall 2011

Wen Ping Chen (S4-906; ext. 65960)

The course consists of two main parts: (1) the morphological and physical characteristics of various material components found in the interstellar space, from extremely cold molecular clouds, to diffuse atomic hydrogen nebulae, to hot ionized gases around luminous stars; (2) our current understanding of star-forming processes, as well as interactions between stars and their environments, will be reviewed. We will discuss what has been observed, and the theories to interpret these results.

* **Textbook:** *Physics of the Interstellar and Intergalactic Medium*, by Bruce T. Draine (2011, Princeton) 新竹華通書坊 03-572-0317

* **Subjects:** gaseous nebulae and dust clouds; photoionization; Strömgren spheres; stellar winds; circumstellar disks and star formation; galactic magnetic fields: Zeeman effects; polarization

Primary reference: *Interstellar Processes* by D.J. Hollenbach & H. A. Thronson, Jr. (Reidel) --- A close look at our Milky Way Galaxy, including its morphology, stellar content, stellar population, kinematics and dynamics.

* **Subjects:** 21-cm line observations; giant molecular clouds; stellar population; initial mass function; galactic kinematics and dynamics; the Galactic center

Primary reference: *Galactic Astronomy* by D. Mihalas and J. Binney (Freeman)

There will be midterm and final exams. Expect homework sets. In addition to “standard” textbook problems, there will be questions for which I do not know the answers myself. For these you will need to read research papers in the literature. The following references are found useful:

- ✓ *Astrophysics II* by Bowers and Deeming
- ✓ *Physics of the Interstellar Medium* by Dyson & Williams
- ✓ *The Milky Way as a Galaxy* by Gilmore, King, & van der Kruit
- ✓ *Astrophysics of Gaseous Nebulae and Active Galactic Nuclei* by Osterbrock
- ✓ *The Galactic Interstellar Medium* by Pfenniger & Bartholdi
- ✓ *Physics of the Galaxy and Interstellar Matter* by Scheffler & Elsässer
- ✓ *Physical Processes in the Interstellar Medium* by Lyman Spitzer

The following are some useful background references:

- ✓ *Stars, Nebulae, and the Interstellar Medium* by Kitchin
- ✓ *Atoms, Stars, and Nebulae* by Aller
- ✓ *The New Cosmos* by Unsöld & Baschek