The objective of this course is to familiarize students with up-to-date concepts and experimental approaches used in the study of eukaryotic gene expression. The main focus of the course is the molecular mechanisms involved in the regulation of RNA polymerase II transcription and pre-mRNA splicing. Specific topics to be covered will include: i) the structure and function of RNA polymerase II and auxiliary factors such as the general transcription factors and transcriptional activator and repressor proteins; ii) the molecular mechanisms of transcriptional activation and repression, notably at the levels of chromatin remodeling, recruitment of transcription machinery to the promoter and transcriptional elongation; iii) the mechanistic coupling of transcriptional elongation with mRNA processing; and iv) specific examples of the role of regulated RNA polymerase II transcription in development and cellular differentiation. Each week, 1-2 selected research papers from the scientific literature will be discussed in class, with students taking turns presenting 1 or 2 figures and the instructor providing clarification and/or additional questions as appropriate (review articles are for background and will not be discussed). Grading for the course will be based upon student presentations of figures (50%) and participation in class discussions (50%).

Jan. 16  **Introduction / Overview** (Ponticelli)


Jan. 23  **TFIID: Structure and Function of TAFs** (Ponticelli)


**Papers to be discussed**:


Jan. 30  **The Mediator Complex** (Ponticelli)


Feb. 6  **Regulation of Transcriptional Elongation** (Ponticelli)


Feb. 13  **Chromatin Remodeling - I** (Ponticelli)


Feb. 20  **Chromatin Remodeling - II** (Ponticelli)


Paper to be discussed: Lo et al. (2001). Snf1 - a histone kinase that works in concert with the histone acetyltransferase Gcn5 to regulate transcription. Science 293: 1142-1146.

Feb. 27  **Coupling of Transcription and mRNA Processing** (Ponticelli)


March 6  **Pre-mRNA Splicing** (Ponticelli)


March 13  ***Spring Break***

March 20  **Transcription Termination** (Ponticelli)


March 27  **mRNA Stability** (Ponticelli)


April 3  **Transcription Control of Vascular Development** (Sinha)

Paper to be discussed:


April 10  **Regulation of Gene Expression by Long Non-Coding RNAs** (Sinha)

Paper to be discussed:


April 17  **Transcription Control by the NFAT Family of Transcription Factors** (Garrett-Sinha)

Paper to be discussed:

April 24  

**Transcription Control by the ETS Family of Transcription Factors**  (Garrett-Sinha)

Paper to be discussed: