



## **Principle of HF Electronics**

5-point graduate course at ITN, Campus Norrköping  
Prof. Shaofang Gong, e-mail: shago@itn.liu.se

### **Introduction**

Electronics has entered into the GHz frequency spectrum, and it will be impossible to deal with electronics in the future if one has no knowledge of high frequency (HF) design principles. This course is intended to give postgraduate students the basic knowledge of HF electronics. It concentrates on such topics as the fundamental theory of transmission lines, high frequency circuit behavior, and matching networks. The course examines the difference between lumped and distributed systems. Students will learn about concepts of characteristic impedance, standing waves, reflection coefficients, and insertion loss, etc. Smith Chart is introduced for graphical display of the reflection coefficient and circuit impedance, and for designing matching circuits. Single and multi-port network representation of HF circuits will be summarized with focus on scattering parameter (s-parameter) matrices.

### **Textbook**

[RF Circuit Design: Theory and Applications, Reinhold Ludwig](#), ISBN 0-13-095323-7. The textbook can be purchased at Akademibokhandeln.

### **Course plan and time schedule**

Week 10-22, every Monday between 13:00-15:00.

### **Lecture**

Totally, 9 lectures (18 hours) will be given.

- Introduction of HF circuit design
- Transmission line theory and analyses I
- Transmission line theory and analyses II
- Smith chart I
- Smith chart II
- Single and multi-port networks
- S-parameters
- Matching and biasing networks
- RF transistor amplifier design

### **Lab**

2 labs (4 hours) on simulation and measurement:

- RF simulation using Matlab
- Measurements using a Network Analyzer

### **Examination**

Solved problems after each lecture, and a final written examination. The textbook can be used for the written examination.

Examiner: Shaofang Gong