



HÖGSKOLAN I GÄVLE

Active Microwave Devices 7.5cr

Aktiva mikrovågssystem 7,5hp

Set by Faculty of Engineering and Sustainable Development

Version

Set at

Valid from

10/11/13

HT2015

Level	A1F
Education level	Second cycle
Course identifier	EEA306
Credits	7.5cr
Main field of study	Electronics
Subject group	Electronics
Disciplinary domain	Technology 100.0%

Learning outcomes

The aim of the course is to give knowledge and understanding of active microwave components and systems. In a mandatory assignment, an active microwave system component is designed and evaluated.

After completion of the course the student shall be able to

1. state and have a good overview over how amplifier/oscillator design using a modern EDA software is working
2. design and calculate the overall performance of a radio-frequency amplifier/oscillator from given fundamental properties and limitations
3. describe the theory behind amplifier/oscillator/detector/mixer design for RF
4. describe the different problems in amplifier/oscillator design and understand their contribution to the whole system
5. implement amplifier/oscillator design in software
6. benefit from scientific reports and manufacturers' application notes
7. use relevant information on the Internet.

Course content

Two-port power gains. Power, available power, transducer power and unilateral power Stability. Stability circles, Roletts stability factor
Conjugate matching and constant gain. Unilateral design and power gain design

Noise in microwave systems. Noise temperature, noise resistance and noise in cascaded systems

Low noise amplifiers. Unilateral design and available power gain design

Linearity aspects. P1dB, IMD, TOI and ACLR

Matching Networks. Lumped matching, Stub matching, matching and tapered lines

Bias Networks. Passive and active networks for BJT and FETs

Device Models. Linear models, non-linear models and Harmonic Balance

Oscillators, detectors and mixers

Diod detectors

RFICs, MICs and MMICs

Teaching

The education is performed in lectures, project, and laboratory work. An assignment is a major part of the course. In the assignment, part of a 5,2-GHz LAN is designed and evaluated. The laboratory work is normally performed in groups of three students. The project is conducted individually. Emphasis is put on the students ability of accomplishing and reporting the work.

The lectures and exercises are not mandatory for the student. However, participation in laboratory work and assignment tasks is mandatory.

Prerequisites

Passive Microwave Devices 7.5 cr or equivalent.

Examination

Written examination, laboratory exercises and project work.

Grade

A, B, C, D, E, Fx, F

Other regulations

Criteria for final grade will be given at the beginning of the course.

Sustainable environment

Content with sustainable development is not relevant to this course.

Module

0010	Written examination	4.5cr	Grade: AF
0020	Assignment	0.6cr	Grade: AF
0030	Project work	2.4cr	Grade: AF