LINKÖPINGS TEKNISKA HÖGSKOLA
Tekniska fakultetskansliet

FÖRSLAG TILL UTBILDNINGSNÄMND INFÖR 2014

NÄMND/NÄMNDER: **Elektroteknik, fysik och matematik**

Förslagsställare (Namn, funktion, Inst/Enhet)

Jerzy Dąbrowski, Docent, ISY/EK

FÖRSLAGET GÄLLER:

a) EXISTERANDE KURS (Ange kurskod och kursnamn)

b) NY KURS (kursnamn, årskurs, önskad läsperiod, schemablocksplacering. Bifoga utkast till kursplan.)

Test of Analog/Mixed-Signal Integrated Circuits, Master's 1st year, VT2, for ELE, D, Y, (IT)

c) ÄNDRING I EXISTERANDE PROFIL/INRIKTNING (Ange Program och Profil/Inriktning. Bifoga beskrivning över vad förslaget går ut på.)

d) NY PROFIL/INRIKTNING (Ange Program och Profilnamn. Bifoga utkast till Profilbeskrivning.)

e) ÖVRIGT (Bifoga beskrivning över vad förslaget går ut på.).

UTBILDNINGSNÄMNDENS BESKED:

FÖRSLAGET I DETALJ:

Motivation:

Practical verification of the contemporary integrated circuits (ICs) that is testing, has proven to be a challenging and costly task. Test of a manufactured IC is indispensable both in the development phase and in mass production. As a critical engineering and economic problem, test of chips and boards (PCBs) has also become a vital research field providing means to facilitate or replace the traditional test with more efficient techniques (such as structural or alternate test), which make the test cheaper in terms of equipment and the test time. Moreover, the complexity of leading edge ICs has triggered interest for Design for Test techniques (DfT) which often are a must in a modern test scenario. Since electronic testing is indispensable and increasingly difficult nowadays, there is a need to prepare a future engineer for this challenge.

While a course on testing of digital circuits has already been offered at LiTH/IDA (TDDC33), there is a lack of a complementary course on testing of analog/ mixed-signal circuits. The latter usually play a role of an interface between analog and digital domain, and as such are critical parts of the contemporary electronic systems. The continuous nature and the effect of noise, loading, or component tolerances and temperature, make analog/ mixed-signal circuits more difficult not only to design but also to test. The analog/ mixed-signal test is different from digital test that, in practice, makes them separate fields of expertise.

Goal: The course should give students a practical knowledge on testing of analog and mixed-signal circuits. Test techniques aimed both at characterization and production test will be provided. The particular objective of the course is that the student will learn principles of testing in terms test equipment, test quality, test metrics including economical aspects, and the existing physical limitations the on the other hand.

Content: Role of testing, Characterization and production test, Testing process and test equipment, Test measures and test economics, Functional and structural testing, Fault models and fault simulation, Alternate test, DSP-based analog and mixed-signal test, Test techniques for common mixed-signal blocks (ADC, DAC, Frequency synthesizer, Transceiver frontends, SerDes). Overview of DfT test techniques and case study.

Organization: 8 x 2h lectures, 4 x 4h labs, 1 project assignment.

Course book: M.L. Bushnell, V.D. Agraval, Essentials of Electronic Testing for Digital, Memory & Mixed-Signal VLSI Circuits, Kluwer Acad. Pub., 2006

Prerequisites: Background in electronic circuits such as TSEK37, TSTE08, TSEK03.

Number of points: 2p lab work + 4p project work = 6p (ECTS)

Impact on education profile
Together with design oriented courses such as TSEK06, TSEK11 or TSTE16 the proposed course can make a solid package where the relation between IC design and test can be well understood and implemented.