LINKÖPINGS TEKNISKA HÖGSKOLA Tekniska fakultetskansliet

FÖRSLAG TILL PROGRAMNÄMND INFÖR ÅR

NÄMND/NÄMNDER:

Förslagsställare (Namn, funktion, Inst/Enhet)

FÖRSLAGET GÄLLER:

- a) EXISTERANDE KURS (Ange kurskod och kursnamn)
- b) NY KURS (Ange kursnamn, årskurs, önskad läsperiod, schemablocksplacering. Bifoga utkast till kursplan.)
- 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.)

PROGRAMNÄMNDENS BESKED:

FÖRSLAGET I DETALJ:

Proposal for some changes in MSc in Materials Science and Nanotechnology (MSN)

Background

MSN is a well-established education program based on existing courses offered mainly by IFM and a strong support for the thesis project work from the competent research in materials science in Linköping. In view of the LiU's strategic plan for enhanced internationalization, as well as a strong demand for the recruitment of students both in quality and quantity, MSN has initiated many activities to establish close cooperation with some universities in China and other countries, e.g. to start recruiting some talent 4th year BS students into MSN through the so-called 3+2 model. We have therefore made some careful investigations on the curriculums of several top-ranked Chinese universities (e.g, South China University of technology, Jilin University, Tongji University, etc.), together with NTHU and NCTU in Taiwan and some other universities in Europe, for comparison.

Apparently, the curriculum of MSN is designed more close to the students with a background in electronics science (electronic materials and devices, optoelectronics, etc.). But for those students who studied in physics science in most of top-ranked Chinese universities, they already finish their theoretical courses during the first three years. Several curses (including mandatory courses) in MSN would thus be covered, meaning a need for the course replacement if we will recruit those students. On the other hand, for those students who studied in materials science, there are more choices for them to select advanced technical courses with a strong connection to marketing-hot areas in their home universities. In order to match those students with somewhat different study backgrounds, and to provide them with a quality education program based on our strength, we thus propose to make some changes and modifications in the curriculum of MSN and the specific requirements as well.

Proposed changes in the curriculum of MSN

As international students usually have a large variation of the background regarding their previous studies, we set up 8 courses as the mandatory part, in order to provide students with a strong scientific foundation for thither studies. Compared to the present curriculum, the corresponding changes are

(1) TFYA77 (suggested new title: Principles of Materials Science) is selected as an introductory mandatory course, while TFFY54 (Quantum Mechanics) becomes an elective course

(2) Include TFYA37 (Soft Matter Physics) into the curriculum, which is considered to be a replacement of the mandatory course TFYA70 (Physics of Condensed Matter I) for those students who have previously studies Solid-state Physics (I) (similar to TFYA70). In a normal case, TFYA37 is an elective course for others

After the mandatory courses, the students in MSN will be guided for studies along two tracks – *Nanostructured Functional Materials & Devices (NFMD)*

- Theory and Modeling of Materials (TMM)

Totally 20 elective courses are included and divided into three groups: (1) 6 elective courses oriented for the students in NFMD; (2) 6 elective courses oriented for the students in TMM; and (3) 8 elective courses are considered to be common for both tracks.

Two courses TFYA36 (Chaos & Non-Linear Phenomena) and TFMT19 (Chemical Sensor Systems) are considering to include, for the point to have more elective choices in connection to hot topics

For the same purpose, two courses TNE103 (Organic Electronics) and TNE093 (Solar cell technology) are borrowed from ITN and considered to be the listed course, i.e. maybe not formally included in the curriculum, but students may select them upon interest (in view of SCUT's general interests)

All those courses to be included in MSN are summarized in Fig. 1 below



The detailed time arrangement for all course are summarized in Fig. 2 and 3,

	Autumn Semester		Spring Semester		
	Ht1	Ht2	Vt1	Vt2	
1	Experimental Physics TFFM08		Analytical Methods in Materials Science TFFM40		B
		Soft Matter Physics TFYA37		Solar cell technology TNE093	
B2	Fundamentals in Materials Science TFYA77	Physics of Condensed Matter I TFYA70	Physics of Condensed Matter II TFYA25	Thin Film Physics TFYA41	В:
				Chaos & Non-Linear Phenomena TFYA36 (1/2)	
В3	Nanotechnology TFYA43		Physical Metallurgy TFYA21	Optoelectronics TFYA38	B
			Chaos & Non-Linear Phenomena TFYA36 (1/2)	Analytical Mechanics TFYA40	
B4		Surface Physics TFYA20	Material Optics TFYA04	Quantum Computers TFYA19	B4
			Organic Electronics 1 TNE103	Chemical Sensor Systems TFMT19	
-	Communication, Ethics and Sustainable Development THEN24				B
. 6	ECTS for each course, if not s	pecified			

	Autumn Semester		Spring Semester		
	Ht1	Ht2	Vt1	Vt2	
1	Semiconductor Physics TFYY47	Quantum Dynamics TFYA28			B1
		Soft Matter Physics TFYA37		Solar Cell Technology TNE093	
2	Quantum Mechanics TFFY54			Thin Film Physics TFYA41	В
				Chaos & Non-Linear Phenomena TFYA36 (1/2)	
3	3D Additive manufacturing TFYA88	Nano Physics TFYY54	Physical Metallurgy TFYA21	Optoelectronics TFYA38	в
	Electrodynamics & Antennas TFYA67	Semiconductor Technology TFYA39	Chaos & Non-Linear Phenomena TFYA36 (1/2)	Analytical Mechanics TFYA40	
4	CDIO Project Course in Physics TFYA51/TFYA50 (12p)		Material Optics TFYA04	Quantum Computers TFYA19	B
		Computational Physics TFYA53	Organic Electronics 1 TNE103	Contemporary Sensor Systems TFMT18	
-	Advanced Project Work in Applied Physics TFYA17				в

where, the mandatory courses are red-colored; the elective courses for NFMD are greencolored; the elective courses for TMM are purple-colored; the common elective courses are blue-colored; and the borrowed elective courses are grey-colored.

Proposed changes in the programme specific requirements of MSN

The programme specific requirements listed in the program website were written long ago, which would fit students with a physics education background. The modifications are suggeted as following

- a bachelor's degree in physics, applied physics, materials science, electronics engineering or equivalent
- at least 20 ECTS credits from the courses of mathematics/applied mathematics and/or application of mathematics relevant to the program, with contents in calculus, linear algebra, vector calculus, Fourier transform and differential equations
- at least 20 ECTS credits from the course of physics with contents in mechanics, wave physics, modern physics, electromagnetism, and thermal and statistical physics.