



Microelectronics and  
Applied Physics (MAP)



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# IM2653 Molecular Electronics

## Course responsible

[Sebastian Lourdudoss](#)

## Aim and course description

The course aims to give an exposure to the emerging field of molecular electronics from basics. Organic semiconductors will be an important introductory part of this course. The theory and practice of fabricating discrete and integrated molecular electronic devices and their applications in diverse fields will be covered. Means of achieving various electronics functionalities such as memory, logic etc. by the molecules will be treated. Lessons from biological molecular behaviour for molecular electronics will be addressed. Nanophotonics is also introduced as an integral part of molecular electronics.

The course will be based on **Michael C. Petty “Molecular Electronics – From Principles to Practice”, Wiley 2007**, but since this is an emerging and cross-disciplinary field complementary materials from several books and scientific publications will also be used. The students will give a seminar on each topic with the help of the lecturer.

The topics addressing the essentials described above have been chosen by the participating students. By this way, this course is also a pedagogical experiment. The students will be trained to prepare a good seminar.

## Examination:

The students will be assessed on the following:

1. Ability to cover and present the chosen topic in a seminar, and to summarize it in a short (2-3 pages) report.
2. 80% attendance on the seminars
3. Written exam

The final grade will be based on the following scale with a weighting of 20% (seminar) and 80% (written exam): F: < 45 %; Fx: 45 – 49%; E 50– 60%; D 61 - 70%; C: 71 – 80%; B: 81- 90% ; A: 91-100%



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Vecka 12			Seminar Slides		Reports
tisdag 2011-03-22	13:00-15:00	533	SL	<a href="#">Bonding in organic compounds and organic semiconductors</a>	
fredag 2011-03-25	13:00-15:00	533	Paras Prasad	<a href="#">Paras Prasad - Guest lecture/seminar on Nanophotonics for Energy</a>	
Vecka 13					
tisdag 2011-03-29	13:00-15:00	533	SL	<a href="#">Conjugated polymers</a>	
fredag 2011-04-01	13:00-15:00	533	Zhibin Zhang	<a href="#">Carbon nanotubes</a>	
Vecka 14					
tisdag 2011-04-05	13:00-15:00	533	Suvanam, Sethu Saveda	<a href="#">Sensing and manipulation of molecules - SPM technologies for characterization and manipulation</a>	<a href="#">Report</a>
			Venkatesh Doddapaneni	<a href="#">Tools for molecular electronics</a>	<a href="#">Report</a>
			Lukinov, Tymofiy	<a href="#">Langmuir-Blodgett films</a>	
torsdag 2011-04-07	10:00-12:00	533	Shi, Yanuo	<a href="#">Organic light-emitting displays</a>	
			Manoj kumar sharma	<a href="#">Organic solar cells</a>	<a href="#">Report</a>
			Sathya prakash Singh	<a href="#">Nanoimprint lithography</a>	<a href="#">Report</a>
			Haulitschke, Katrin	<a href="#">Organic field-effect transistors</a>	<a href="#">Report</a>
fredag 2011-04-08	13:00-15:00	533	Afzal Muhammad	<a href="#">Semiconductor and molecular assembly nanowires</a>	<a href="#">Report</a>
			Xu Chenzhi	<a href="#">Molecular rectification</a>	
Vecka 15					
tisdag 2011-04-12	13:00-15:00	533	<b>Jenny Ottosson</b>	<a href="#">Introduction to DNAs and proteins</a>	
fredag 2011-04-15	13:00-15:00	533	Guyon, Cecile Marie Clementine	<a href="#">Biology inspired concepts</a>	
			Hossain, Amin	<a href="#">Functional devices from DNAs and proteins</a>	
			Stefan Wagner	<a href="#">Lab on chip</a>	<a href="#">Report</a>
			SAAD Mohamed	<a href="#">Biological transistor</a>	<a href="#">Report</a>
Vecka 17					
tisdag 2011-04-26	13:00-15:00	533	Xiong, Kunli	Photochromism	
			Catheline, Sébastien	<a href="#">Molecular self-assembly device construction and testing</a>	<a href="#">Report</a>
			Vincent Prevot	Organic integrated circuits	
fredag 2011-04-29	13:00-15:00	533	Mattias Hammar	<a href="#">Electrical conductivity</a>	
			Min Yan	<a href="#">Nanophotonics</a>	
Vecka 18					
tisdag 2011-05-03	13:00-15:00	533	Victor Chaulot-Talmon	<a href="#">Charge transport in DNA based devices/</a>	
			Chin, Hou-Man	<a href="#">"CMOL" - Hybrid semiconductor/nanowire /molecular devices, circuits and architecture/</a>	<a href="#">Report</a>
			Beaudouin, Quentin François-Xavier J	<a href="#">Programming nanocells</a>	<a href="#">Report</a>

			Anderson Smith	<a href="#">Supercapacitors</a>	<a href="#">Report</a>
			Balaban Mesut	<a href="#">Chemical sensors and actuators</a>	
fredag 2011-05-06	13:00-15:00	533	Shafiullah, Mohammad	<a href="#">Liquid crystals</a>	<a href="#">Report</a>
			Chen Hu	<a href="#">Dip-pen Lithography</a>	<a href="#">Report</a>
			Wang xiaoyi	Making contacts to single molecules	
			Romain Jegoux	Nanofluidics and NEMS	
			Araz	<a href="#">Nanorobotics</a>	<a href="#">Report</a>
<b>Vecka 20</b>					
fredag 2011-05-20	13:00-15:00	533	David Guinle	Organic vapor-phase deposition	
			Toulemont, Arthur	Graphene	
			Yadollahy Afshan	Graphene	
			Farineau, Yann	Molecular memory	
			Xu Sun	Biosensors	
<b>Vecka 21</b>					
måndag 2011-05-23	14.00-19.00	532.53		Ordinarie tentamen, 7,5hp	

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# Nanorobotics in medicine



*Presented by*  
**Araz Garehjalou**

# REFERENCE

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- [http://www.links999.net/robotics/robots/robots\\_introduction.html](http://www.links999.net/robotics/robots/robots_introduction.html)
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- Sensors 2008, 8, 2932-2958; DOI: 10.3390/s8052932