Endringsrapport for emne MENA5010

Stadiuminfo:	Kvalitetssikring (S2)
Sist endret:	02.09.2019 Silje Fjørtoft (siljfj)
Opprettet i EpN:	Nei

	Gammel verdi (S0, Importert fra FS)	Ny verdi (S2, Kvalitetssikring)

Generelt

Siste undervisningstermin	Ikke valgt	2018 VÅR

Rapportering

Ingen endringer

Undervisning

Undervisningsspråk	Ikke valgt	Engelsk

Emneinfo

Kort om emnet:
Ingen endringer

Karakterskala:
Ingen endringer

Eksamen:
Ingen endringer

Anbefalte forkunnskaper:
Ingen endringer

Obligatoriske forkunnskaper:
Ingen endringer

Undervisning:
Engelsk:
This It is an intensive course where the lectures will be arranged in agreement with the students.in 2020. Teaching consists of six academic hours of lectures per week during eight weeks. In addition to this, there will be time for student's presentations of their chosen subject linked to nanophysics.
Problems solving is abandoned this year. The compulsory presentation provides clearance to exam and counts 40% of examination grade while oral exam counts 60%.
In teaching, student's active learning is strongly encouraged, in which students in their presentations and problems solving address other students and discuss with them details of derivations with comments and

help of teacher. A component of preliminary work with the subject and a discussion with student, rather than continuous lecturing, is constantly increasing during the course. In discussions, the stronger students are helping students with lower background, using advantage of being able to quicker recognise problems they could face. The help of PhD students to Ms students is highly encouraged.
Laboratory visits will be abandoned this year due to shortage of time.

Hva lærer du?:
Engelsk:

- Why do we need nanometer-sized devices?
- Road map of modern electronics: From CMOS technology to molecular electronics, spintronics, nanophotonics, and quantum computations.
- Mesoscopic transport: Brief overview of main principles, materials, and devices.
- A Brief Update of Conventional Solid State Physics. Crystal structures. Electronic energy bands and their occupation, envelope functions and effective mass, doping.Diffusive transport, scattering mechanisms, screening. Surfaces, Interfaces, and Layered Devices Electronic surface states. Semiconductor-metal interface. Semiconductor heterostructures. Field-effect transistors and quantum wells. Mesoscopic Physics.
- Two-dimensional electron systems: general properties, magneto-conductance, the quantum Hall effect.
- Quantum Wires and Quantum Point Contacts: Diffusive quantum wires, ballistic wires (conductance quantization), carbon nanotubes, quantum point contacts
- Electronic Phase Coherence: The Aharonov-Bohm effect, weak localization, resonant tunneling.
- Single-Electron Tunneling: Coulomb blockade, single-electron tunneling devices, electron pumping, etc.
- Quantum Dots: Role of electron-electron interaction, conductance resonances, etc.
- Mesoscopic superconductivity: Josephson effect and its applications, hybrid systems, etc.
- New Directions in Electronics. Spintronics, Molecular Electronics, Nanomechanics, Nanophotonics, Devices for Quantum Computation. Experimental Aspects (will be presented by students and taken into account for the exam grade).
- Sample growth and fabrication: Single crystal growth; growth of layered structures, epitaxy -liquid phase epitaxy (LPE), molecular chemical vapor deposition (MOCVD), molecular beam epitaxy (MBE), magnetron sputtering, etc. Lateral patterning (electron beam patterning) and bonding.
- Sample characterization: Electron microscopy (TEM, SEM); Tunneling microscopy (STM); Secondary ion mass spectroscopy (SIMS); X-ray spectroscopy; Elements of cryogenics.

Kursavgift:
Ingen endringer

Adgang til ny eller utsatt eksamen:
Ingen endringer

Eksamensspråk:
Ingen endringer

Kostnader ved å ta emnet:
Ingen endringer

Opptak til emnet:
Ingen endringer

Overlappende emner:
Ingen endringer

Hjelpemidler:
Ingen endringer