Assessment and subject description

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| Óbuda UniversityKandó Kálmán Faculty of Electrical Engineering | | | | | | Institute of Microelectronics and Technology | | | | |
| *Subject name and code****:*** *Micro- and nanotechnology* **KEXNTBAMNE Credits: 5** **Full-time, Spring Semester** | | | | | | | | | | |
| Course: **Mechatronic Engineering, MSc** | | | | | | | | | | |
| Responsible: | **Balázs Kovács, Ph.D.** | | | | Teaching staff: | **Balázs Kovács, Ph.D.** | | | | |
| Prerequisites: | | |  | | | | | | | |
| Contact hours per week: | | Lecture: **2** | | Class discussion: | | | Lab hours: **2** | | Tutorial: | |
| Assessment and evaluation: | | **Exam** | | | | | | | | |
| **Subject description** | | | | | | | | | | |
| *Aims*: To offer a knowledge concerning the processes of micro- and nanoelectronic and related electromechanical devices, theirs’s physical background, manufacturing technologies and fields of applications. | | | | | | | | | | |
| *Topics to be covered:* | | | | | | | | | | |
| **Topics** | | | | | | | | **Week** | | **Lessons** |
| Introduction, Basics of crystallography | | | | | | | | 1. | | 2 |
| Basics of device physics | | | | | | | | 2. | | 2 |
| Bipolar and unipolar devices | | | | | | | | 3. | | 2 |
| Photoelectric devices. Nanosize devices | | | | | | | | 4. | | 2 |
| Test | | | | | | | | 5. | | 2 |
| Crystal growth. Layer deposition. Doping and oxidation | | | | | | | | 6. | | 2 |
| Layer’s removal, pattern formation, lithography | | | | | | | | 7. | | 2 |
| University Break | | | | | | | | 8. | |  |
| IC technology sequences | | | | | | | | 9. | | 2 |
| Nanomaterial and nanostructure production | | | | | | | | 10. | | 2 |
| Test | | | | | | | | 11. | | 2 |
| National Holiday | | | | | | | | 12. | | 2 |
| MEMS, NEMS technology sequences and devices | | | | | | | | 13. | | 2 |
| CNT and graphene devices | | | | | | | | 14. | | 2 |
| **Laboratory** | | | | | | | |  | |  |
| Measurements of pn junction | | | | | | | | 1. | | 4 |
| Photoelectric phenomenon | | | | | | | | 3. | | 4 |
| Photodetectors | | | | | | | | 5. | | 4 |
| Thermal sensors | | | | | | | | 7. | | 4 |
| Official break | | | | | | | | 9. | | 4 |
| Hall measurement | | | | | | | | 11. | | 4 |
| MEMS pressure sensors | | | | | | | | 13. | | 4 |
| **Assessment and evaluation**  Requirements of the signature:  To attend the lectures and laboratories is obligatory. Above that it is required to pass two tests and to perform all laboratory tasks.  Type of exam:  Written and oral  Evaluation of the exam:  To pass the exam to reach at least 50% is required. | | | | | | | | | | |
| Suggested material **Semiconductor Devices: Physics and Technology**  Simon M. Sze, Ming-Kwei Lee; 592 pages; John Wiley & Sons; 3rd edition (May 15, 2012); ISBN-10: 0470537949; ISBN-13: 978-0470537947  **Introduction to Nanotechnology**  Charles P. Poole Jr., Frank J. Owens; 391 pages; John Wiley & Sons; 1st edition (May 30, 2003); ISBN-10: 0471079359; ISBN-13: 978-0471079354  **Fundamentals of Microfabrication and Nanotechnology,**  Third Edition, Three-Volume Set Marc J. Madou; 1992 pages; CRC Press; 3rd edition (August 1, 2011); ISBN-10: 0849331803; ISBN-13: 978-0849331800  **Physics of Semiconductor Devices**  Simon M. Sze, Kwok K. Ng; 832 pages; John Wiley & Sons; 3rd edition (October 27, 2006); ISBN-10: 0471143235; ISBN-13: 978-0471143239  **Handbook of Semiconductor Manufacturing Technology,**  Second Edition Yoshio Nishi, Robert Doering; 1720 pages; CRC Press; 2nd edition (July 9, 2007);  ISBN-10: 1574446754; ISBN-13: 978-1574446753  **Semiconductor Manufacturing Technology**  Michael Quirk, Julian Serda; 666 pages; Prentice Hall; 1st edition (November 19, 2000); ISBN-10: 0130815209; ISBN-13: 978-0130815200 | | | | | | | | | | |
| Comment:  The lecture's materials are the basics of the learning process. They could be found on the concerned web sites of the university. | | | | | | | | | | |