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 oralEvaluation 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.  |