

Interdisciplinary Ph.D. Studies in the field of Nanotechnology (abrev: ISD N) conducted in English – 2014-2018 (obligatory for Ph.D. students at Poznan University of Nanotechnology and Adam Mickiewicz University of Poznan)

The first year of this Ph.D. course starts on June the 1st 2014, and lasts till February 28th 2015, the next years will start on March 1st in 2016, 2017, 2018 years

| Year | Subjects | number of hours during year | | | | | | ECTS |
|------|--|-----------------------------|------------|----------|-----------|------------|-------------------------|-----------|
| | | SUM | lectures | exercise | seminar | laboratory | internsh. and workshops | |
| 1 | Lecture "Introduction to Nanotechnology" parts 1,2 and 3 (obligatory) | 30 | 30 | | | | | 0 |
| | Pedagogical Training# | 60 | 60 | | | | | 6 |
| | Methodology of Research## | 10 | 10 | | | | | 2 |
| | Multicriterial Support of Decisions in Engineering Issues ## | 10 | 10 | | | | | 1 |
| | Metodology and Principles of Scientific Reports Editing | 10 | 10 | | | | | 1 |
| | Scientific and Research Projects | 10 | 10 | | | | | 1 |
| | Teacher Practice | 0 | | | | | 15 | |
| | Substantiated Work with Scientific Supervisor | 10 | | | 10 | | | 1 |
| | Workshops with economy and management experts | 0 | | | | | 40 | |
| | razem | 140 | 130 | 0 | 10 | 0 | 55 | 12 |
| 2 | Lecture Computational Methods in Nanotechnology (obligatory) | 45 | 30 | | | 15 | | 0 |
| | Pedagogical Training | 0 | | | | | 15 | |
| | Editing Publications and Diploma Theses in English | 30 | 30 | | | | | 3 |
| | Obligatory Major Lecture*** | 20 | 20 | | | | | 2 |
| | Substantiated Work with Scientific Supervisor | 10 | | | 10 | | | 1 |
| | Obligatory 3 months Scientific Internship at Foreign Partner Institution (internship closing date - no later than May 31st 2015. | 105 | | | | 105 | | 6 |
| | Workshops with economy and management experts | | | | | | 40 | |
| | razem | 210 | 80 | 0 | 10 | 120 | 55 | 12 |
| 3 | Supplementary Subject Lecture### | 30 | 30 | | | | | 3 |
| | Pedagogical Training | | | | | | 15 | |
| | Specialization Lecture (elective) 1**** | 10 | 10 | | | | | 1 |
| | Udokumentowa praca z opiekunem naukowym | 10 | | | 10 | | | 1 |
| | Doctoral Seminar | 15 | | | 15 | | | 2 |
| | razem | 65 | 40 | 0 | 25 | | 15 | 7 |
| 4 | Pedagogical Training | 0 | | | | | 15 | |
| | Specialization Lecture (elective) 2**** | 10 | 10 | | | | | 1 |
| | Substantiated Work with Scientific Supervisor | 10 | | | 10 | | | 1 |
| | Doctoral Seminar | 15 | | | 15 | | | 2 |
| | razem | 35 | 10 | 0 | 25 | 0 | 15 | 4 |
| | program ISD N razem | 450 | 260 | 0 | 70 | 120 | 140 | 35 |

* Lecture "Introduction to Nanotechnology" parts 1,2 and 3 and Lecture "Computational Methods in Nanotechnology" are obligatory for the Project 0049/13 beneficiaries (within the first edition of ISD N).

* part1, 10 h. - "Scanning Probe and Electron Microscopy in Nanoscience and Nanotechnology" to be given by Faculty of Technical Physics (PUT) professors - prof.. Ryszard Czajka

* part 2, 10 h. - "Self-assembling molecular systems and nanostructures" to be given by Fac. of Chem AMU professors - dr hab.

* part 3, 10 h. - "Chemical Technology Methods in Nanotechnology" to be given by Faculty of Chemical Technology (PUT) professors -prf. Elżbieta Frąckowiak

**Lectures and computer laboratory from "Computational Methods in Nanotechnology" (3 semester) will be based on quantum physics and chemistry methods most frequently used in nanoscience and nanotechnology. Lecturers and time schedule division will be a subject of agreement among Project Partners. Obligatory for all Ph.D. Students of ISD N.

***** - during consultation with Univ. Trieste and other partners**

******elective specialization lectures - 2 to be chosen by the whole Ph.D students' group**

Faculty of Chemical Technology, PUT - to be consulted with Univ. Trieste

1. dr hab. inż. S. Borysiak: „Chemistry of polymers and polymer composites”
2. dr hab. inż. G. Lota: „Nanomateriały do magazynowania energii”

Faculty of Technical Physics, PUT - to be consulted with Univ. Trieste

1. Principle of photovoltaics - prof. dr hab. Danuta Wróbel
2. Spectroscopy of Nanomaterials - prof. dr hab. Alina Dudkowiak/ dr hab. Mirosław Szybowicz

Faculty of Chemistry, AMU - to be consulted with Univ. Trieste

- 1.
- 2.

Remarks:

Substantiated Work with Scientific Supervisor- the report form to be set individually with Ph.D. student scientific supervisor

Number of lectures or exercises conducted with students may be dependent on given Faculty limits !

during the first edition of ISD N the Pedagogical Training will be conducted during the 2 and 3 semesters, exceptionally.(During subsequent editions of ISD N - 1 and 2 semester).

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elective subject among: Economics, Philosophy, Philosophy with Ethics components

Major lectures proposals

1. Solid state physics - an introduction
2. Electron properties in 1D and 2D systems
3. Unique properties of nanomaterials
4. New materials and physical phenomena in nanoelectronics
5. Nanomaterials in photovoltaics
6. Multiferroics – switchable electronic components

Elective specialization lectures proposals

1. Principles of photovoltaics
2. Electron and Scanning Probe Microscopy in nanomaterials studies
3. Magnetic materials in nanoelectronics – properties and fabrication
- 4. Spectroscopy of nanomaterials**
5. The application of X-Ray diffraction in the studies of structure of single-nanowire silicon solar cell
6. Methods of preparation and investigation of nanostructures