



Faculty of: Physics and Applied Computer Science

Field of study: Technical Physics Study level: Second-cycle studies Form and type of study: Full-time studies

Annual: 2016/2017 Lecture language: Polish

| Code  | Module name                                     | Lectures | Auditorium classes | Laboratory classes | Project classes | Conversation seminar | Seminar classes | Practical classes | Fieldwork classes | Workshops | Others | E-learning | ECTS | E   |
|---|---|----------|--------------------|--------------------|-----------------|----------------------|-----------------|-------------------|-------------------|-----------|--------|------------|------|-----|
| <b>Semester 1</b>   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| Engineering   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-102-s   | Modern Electronics                              | 28       | 0                  | 42                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 6    | No  |
| JFT-2-103-s   | Advanced data analysis                          | 14       | 0                  | 28                 | 10              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | Yes |
| Non-technical   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-105-s   | język obcy techniczny                           | 0        | 28                 | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| Physics   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-101-s   | Quantum Mechanics                               | 42       | 28                 | 0                  | 0               | 0                    | 14              | 0                 | 0                 | 0         | 0      | 0          | 8    | Yes |
| <b>Moduły obieralne FT2 - sem. 1</b>  |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| The rules for selecting groups/modules: Student wybiera przedmioty obieralne o łącznej liczbie ECTS nie mniejszej od 9. |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            | 9    |     |
| Suma ECTS   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            | 30   |     |
| <b>Semester 2</b>   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| Engineering   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-201-s   | Seminarium fizyki technicznej                   | 0        | 0                  | 0                  | 0               | 0                    | 45              | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| Non-technical   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-203-s   | Entreprenurship                                 | 30       | 0                  | 0                  | 6               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 5    | No  |
| Other Basic   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-202-s   | Coordination and funding of scientific research | 15       | 0                  | 0                  | 15              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 2    | No  |
| Physics   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-204-s   | Praktyka dyplomowa                              | 0        | 0                  | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |

## Study programme - Technical Physics - 2016/2017

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|--|---|----------|--------------------|--------------------|-----------------|----------------------|-----------------|-------------------|-------------------|-----------|--------|------------|------|-----|
| <b>Moduły obieralne FT2 - sem. 2</b>   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            | 15   |     |
| The rules for selecting groups/modules: Zasady wyboru grup/modułów: Student wybiera przedmioty obieralne o łącznej liczbie ECTS nie mniejszej od 15. |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| Suma ECTS  |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            | 30   |     |
| <b>Semester 3</b>  |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| Engineering  |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-301-s  | Seminarium dyplomowe  | 0        | 0                  | 0                  | 0               | 0                    | 45              | 0                 | 0                 | 0         | 0      | 0          | 5    | No  |
| Thesis   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-303-s  | Master's thesis   | 0        | 0                  | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 20   | Yes |
| <b>Moduły obieralne FT2 - sem. 3</b>   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            | 5    |     |
| The rules for selecting groups/modules: Student wybiera przedmioty obieralne o łącznej liczbie ECTS nie mniejszej od 5.                              |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| Suma ECTS  |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            | 30   |     |
| <b>Semester 0 - Completion of modules in any semester</b>  |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| Engineering  |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-007-s  | Języki skryptowe - metodologia pracy                        | 15       | 0                  | 15                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-008-s  | Modelling of environmental processes                        | 15       | 0                  | 0                  | 30              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-009-s  | Geochemistry  | 30       | 15                 | 0                  | 15              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 5    | Yes |
| JFT-2-024-s  | Radiochemia   | 30       | 0                  | 30                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 5    | No  |
| JFT-2-029-s  | Data Acquisition Systems                                    | 0        | 0                  | 30                 | 30              | 0                    | 30              | 0                 | 0                 | 0         | 0      | 0          | 6    | Yes |
| JFT-2-031-s  | Kriogenika  | 30       | 0                  | 15                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-032-s  | User Interface  | 30       | 0                  | 15                 | 15              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-034-s  | Python in the enterprise                                    | 15       | 0                  | 18                 | 10              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-035-s  | Multicore programming                                       | 15       | 0                  | 18                 | 10              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-036-s  | Design of integrated circuits in CMOS technology, I         | 15       | 0                  | 30                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-039-s  | Applications for Mobile Devices                             | 15       | 0                  | 30                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-041-s  | Nowoczesne metody pomiarowe                                 | 30       | 0                  | 45                 | 0               | 15                   | 0               | 0                 | 0                 | 0         | 0      | 0          | 7    | No  |
| JFT-2-042-s  | Fotosynteza   | 30       | 0                  | 20                 | 0               | 0                    | 8               | 0                 | 0                 | 0         | 0      | 0          | 5    | No  |
| JFT-2-043-s  | Photosynthesis (small course)                               | 22       | 0                  | 0                  | 0               | 0                    | 6               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-044-s  | Design of integrated circuits in CMOS technology, II        | 15       | 0                  | 30                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-045-s  | Hardware Description Language                               | 20       | 0                  | 22                 | 15              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 6    | No  |
| JFT-2-046-s  | Projektowanie Systemów Cyfrowych                            | 30       | 0                  | 30                 | 15              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 5    | No  |
| JFT-2-047-s  | Microprocessor techniques                                   | 20       | 0                  | 22                 | 15              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 5    | No  |
| JFT-2-048-s  | Scientific Text Edition and Presentation                    | 15       | 0                  | 15                 | 0               | 0                    | 15              | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-052-s  | VPython: 3D simulations of physical processes for everybody | 15       | 0                  | 30                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-056-s  | Trace Analysis  | 15       | 0                  | 15                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-057-s  | Data Analysis   | 20       | 0                  | 20                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-058-s  | Introduction to X-ray fluorescence analysis                 | 15       | 0                  | 0                  | 0               | 0                    | 15              | 0                 | 0                 | 14        | 0      | 0          | 4    | Yes |
| JFT-2-060-s  | Microtomography   | 22       | 0                  | 15                 | 0               | 8                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| Mathematics  |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-028-s  | Wstęp do teorii gier  | 30       | 0                  | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | Yes |
| Other Basic  |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |

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|--|---|----------|--------------------|--------------------|-----------------|----------------------|-----------------|-------------------|-------------------|-----------|--------|------------|------|-----|
| JFT-2-055-s  | Fundamentals of quantum computations  | 28       | 0                  | 0                  | 0               | 0                    | 28              | 0                 | 0                 | 0         | 0      | 0          | 5    | Yes |
| <b>Physics</b>   |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-010-s  | Promieniotwórczość w środowisku   | 30       | 0                  | 15                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-011-s  | Solid State Structures and Symmetries   | 30       | 0                  | 15                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | Yes |
| JFT-2-012-s  | Metody doświadczalne fizyki fazy skondensowanej                                     | 30       | 0                  | 15                 | 0               | 0                    | 15              | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-013-s  | Soft Matter Physics   | 30       | 15                 | 0                  | 0               | 0                    | 15              | 0                 | 0                 | 0         | 0      | 0          | 4    | Yes |
| JFT-2-014-s  | Semiconductor Materials and Devices   | 30       | 0                  | 0                  | 0               | 0                    | 30              | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-015-s  | Physics of Disordered Matter  | 30       | 0                  | 15                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-016-s  | Laboratorium fizyki fazy skondensowanej   | 0        | 0                  | 45                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 5    | No  |
| JFT-2-017-s  | Physics of Surface, Thin Films and Nanostructures                                   | 30       | 0                  | 0                  | 0               | 0                    | 0               | 15                | 0                 | 0         | 0      | 0          | 4    | Yes |
| JFT-2-018-s  | Metody analityczne w badaniach środowiska   | 30       | 0                  | 15                 | 0               | 0                    | 0               | 6                 | 0                 | 0         | 0      | 0          | 4    | Yes |
| JFT-2-019-s  | Monitoring środowiska   | 0        | 0                  | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 5    | Yes |
| JFT-2-020-s  | Jądrowe metody pomiarowe  | 30       | 0                  | 30                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 5    | Yes |
| JFT-2-021-s  | Fizyka konwersji energii  | 30       | 15                 | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-022-s  | Globalne cykle biogeochemiczne  | 25       | 0                  | 0                  | 8               | 0                    | 12              | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-023-s  | Współczesne zastosowania promieniowania X   | 30       | 0                  | 15                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | Yes |
| JFT-2-025-s  | Magnetism and Physics of Metals   | 30       | 0                  | 12                 | 0               | 0                    | 4               | 0                 | 0                 | 0         | 0      | 0          | 3    | Yes |
| JFT-2-030-s  | Teoria grup a symetrie w fizyce   | 30       | 15                 | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-038-s  | Fizyka żeglowania   | 30       | 0                  | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 2    | No  |
| JFT-2-049-s  | Introduction to quantum optics  | 30       | 30                 | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-050-s  | Scattering theory - the minimum necessary for physicists                            | 30       | 30                 | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | Yes |
| JFT-2-051-s  | Introduction to atomic and molecular physics - the minimum necessary for physicists | 30       | 30                 | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | Yes |
| JFT-2-053-s  | Fizyka powierzchni i cienkich warstw  | 28       | 0                  | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-054-s  | Symetrie i struktury, ciało stałe i biomolekuły                                     | 28       | 14                 | 14                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | Yes |
| JFT-2-059-s  | Laboratory of advanced nuclear techniques   | 0        | 0                  | 30                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-061-s  | An introduction to quantum theory of electronic transport                           | 30       | 0                  | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-062-s  | Introduction to eddy covariance   | 16       | 0                  | 16                 | 0               | 0                    | 0               | 0                 | 8                 | 0         | 0      | 0          | 4    | Yes |
| JFT-2-063-s  | Introduction to synchrotron radiation and its applications                          | 15       | 0                  | 0                  | 15              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-064-s  | X-ray physics   | 30       | 15                 | 15                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 6    | No  |
| <b>Obieralne z zakresu elektroniki i systemów detekcyjnych</b> |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| The rules for selecting groups/modules:                        |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-026-s  | Nuclear Electronics   | 45       | 15                 | 30                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 7    | Yes |
| JFT-2-027-s  | Pozycjoczułe detektory cząstek jonizujących i promieniowania X                      | 15       | 0                  | 15                 | 0               | 0                    | 15              | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| <b>Obieralne z zakresu fizyki cząstek elementarnych</b>        |   |          |                    |                    |                 |                      |                 |                   |                   |           |        |            |      |     |
| JFT-2-001-s  | Wstęp do oddziaływań hadronów   | 30       | 15                 | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-002-s  | Fizyka ultrarelatywistycznych zderzeń ciężkich jonów                                | 20       | 8                  | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-003-s  | Promieniowanie kosmiczne i neutrina   | 20       | 8                  | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No  |
| JFT-2-004-s  | Wstęp do Modelu Standardowego   | 30       | 8                  | 0                  | 6               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No  |
| JFT-2-005-s  | Metody analizy danych doświadczalnych   | 30       | 15                 | 0                  | 15              | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 5    | Yes |

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|-------------|--|----------|--------------------|--------------------|-----------------|----------------------|-----------------|-------------------|-------------------|-----------|--------|------------|------|----|
| IFT-2-006-s | Metody doświadczalne fizyki wysokich energii | 20       | 0                  | 22                 | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 4    | No |
| IFT-2-033-s | Particle Accelerators                        | 30       | 15                 | 0                  | 0               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No |
| IFT-2-040-s | CP Violation in Heavy Flavour Physics        | 16       | 6                  | 0                  | 6               | 0                    | 0               | 0                 | 0                 | 0         | 0      | 0          | 3    | No |