

**FIȘA DISCIPLINEI**

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| <b>Universitatea</b> | <b>UNIVERSITATEA DE VEST TIMISOARA</b> |
| Facultatea           | <b>FIZICA</b>                          |
| Specializarea        | <b>PTAM (master)</b>                   |

**I.**

|                            |                                    |
|----------------------------|------------------------------------|
| <b>Denumire disciplină</b> | Complements of Theoretical Physics |
|----------------------------|------------------------------------|

**II.**

| <b>Structură disciplină (Nr. ore săptămânal)</b> |                         |                         |          |          |          |           |         |
|--|-------------------------|-------------------------|----------|----------|----------|-----------|---------|
| Cod disciplină                                   | Semestrul <sup>2)</sup> | Categoria <sup>3)</sup> | Credite  | Curs     | Seminar  | Laborator | Proiect |
| <b>PTAM 1101</b>                                 | <b>1</b>                | <b>DF</b>               | <b>7</b> | <b>2</b> | <b>2</b> |           |         |

**III.**

| <b>Statut disciplină</b> | Obligatorie | Opțională | Facultativă |
|--------------------------|-------------|-----------|-------------|
|                          | <b>x</b>    |           |             |

**IV.**

| <b>Titular disciplină</b>          |                          |                          |           |         |
|------------------------------------|--------------------------|--------------------------|-----------|---------|
|                                    | Curs                     | Seminar                  | Laborator | Proiect |
| Numele și prenumele                | <b>Ion Cotaescu j.r.</b> | <b>Ion Cotaescu j.r.</b> |           |         |
| Instituția                         | <b>UVT</b>               | <b>UVT</b>               |           |         |
| Catedră/Departament                | <b>FIZICA/FIZICA</b>     | <b>FIZICA/FIZICA</b>     |           |         |
| Titlul științific                  | <b>Doctor</b>            | <b>Doctor</b>            |           |         |
| Gradul didactic                    | <b>Lector</b>            | <b>Lector</b>            |           |         |
| Încadrarea (norma de bază/asociat) | <b>Lector</b>            | <b>Lector</b>            |           |         |
| Vârsta                             | <b>52</b>                | <b>52</b>                |           |         |

**V.**

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| <b>Course objectives:</b> Completion of students' knowledge in the field of Theoretical Physics. Accumulation of notions and knowledge to help them understand the phenomena and calculations that occur during the master's degree. |
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**VI.**

| <b>Conținutul disciplinei</b>  | <b>Nr hours/week</b> |
|--|----------------------|
| <b>VI.1. Course</b>  |                      |
| 1. Introduction. Development of different branches of physics and the object of study of the course.           | <b>2/1 week</b>      |
| 2. Newtonian mechanics. Notions of rigid solid mechanics, moments of inertia, symmetry.                        | <b>4/2 weeks</b>     |
| 3. Theoretical mechanics. Lagrange and Hamilton equations, the principle of minimum action, conservation laws. | <b>4/2weeks</b>      |
| 4. Quantum mechanics. Schrodinger equation. Principles of quantum mechanics, operators and eigenvalues.        | <b>4/2 weeks</b>     |
| 5. The spine and its own magnetic moment.  | <b>4/2 weeks</b>     |
| 6. Elements of perturbation theory.  | <b>6/3 weeks</b>     |
| 7. Lorentz transformations and special relativity.   | <b>4/2 weeks</b>     |
| <b>VI.2. Seminar</b>   |                      |
| 1. Inertial reference systems, Galileo transformations, coordinate systems.                                    | <b>2/1 week</b>      |
| 2. The problem of the two bodies, the movement in the central field, conservation laws.                        | <b>4/2 weeks</b>     |
| 3. Harmonic oscillator.  | <b>4/2 weeks</b>     |
| 4. Hydrogen atom, quantum numbers.   | <b>4/2 weeks</b>     |
| 5. $\frac{1}{2}$ Spin, Schrodinger-Pauli equation.   | <b>4/2 weeks</b>     |

|   |                  |
|---|------------------|
| 6. Some calculations of perturbations to simple stationary systems. | <b>4/2 weeks</b> |
| 7. Diamagnetism and paramagnetism.                                  | <b>2 /1 week</b> |
| 8. Theory of special relativity problems.                           | <b>4/2 weeks</b> |
| <b>VI.3. Lucrări de laborator (dacă este cazul)</b>                 |                  |
| <b>VI.4. Tematică proiect (dacă este cazul)</b>                     |                  |

**VII.**
**Bibliografie**

1. Serban Titeica, Mecanica Cuantica ( Editura Academiei R.S.R. 1984).
2. A. Messiah, Mecanica Cuantica (Editura Stiintifica 1973).
3. I Cotaescu, Curs de mecanica cuantica (Tipografia Universitatii din Timisoara 1990).
4. Arno Bohm, Quantum Mechanics (Springer-Verlag 1994)
5. Viorica Florescu, Tudor Marian, Mircea Zaharia, Probleme de Mecanica Cuantica (Univ. Bucuresti 1986)
6. L. Landau, E.M. Lifsit, Mecanica cuantica. (Editura Tehnica, Bucuresti 1968) .

**VIII.**
**Modul de transmitere a informatiilor**

| <b>Forme de activitate</b> | <b>Metode didactice folosite</b>                                      |
|----------------------------|---|
| Curs                       | online, google Meet si Classroom ( se va comunica studentilor adresa) |
| Seminar                    | fata in fata, tabla, proiector video.                                 |
| Laborator                  |   |
| Proiect                    |   |

**IX.**
**Evaluare**

| <b>Forme de activitate</b> | <b>Evaluare</b>   | <b>% din nota finală</b> |
|----------------------------|---|--------------------------|
| Examen                     | Examen- Lucrare scrisa tip grila, pentru nota minima se vor comunica subiectele   | 50%                      |
| Seminar                    | Portofoliu de referate si probleme, pentru nota minima se vor comunica cerintele. | 50%                      |
| Laborator                  |   |                          |
| Proiect                    |   |                          |

**Skills acquired by the student:**

Knowledge and understanding of discipline-specific phenomena, training and development of theoretical skills to solve specific problems and to interpret correctly and completely the results, practicing teamwork and the ability to organize and investigate, cultivating a scientific environment based on values, ethics professionalism and quality, are just a few arguments that motivate the usefulness of this discipline for the training of a future physicist.

 Data:  
17.09.2021

 Directorul de Departament,  
Conf.dr.Nicoleta Stefu

 Titular curs,  
Lect. dr. Ion Cotaescu j.r.