

[DEGREE PROGRAMMES](#)[BOLOGNA](#)[THE INSTITUTION](#)[INFO FOR STUDENTS](#)You are here : [Home](#) [Master's Degree& Doctorate Degree](#) [Physics \(Master\)](#) [Internal Structures Of The Stars I](#) **Course Information**

## Course Information

### COURSE INFORMATION

| Course Title                       | Code   | Semester | L+U Hour | Credits | ECTS |
|------------------------------------|--------|----------|----------|---------|------|
| Internal Structures Of The Stars I | FZ5017 |          | 3 + 0    | 3.0     | 7.5  |

|                      |      |
|----------------------|------|
| <b>Prerequisites</b> | None |
|----------------------|------|

|                                |         |
|--------------------------------|---------|
| <b>Language of Instruction</b> | Turkish |
|--------------------------------|---------|

|                     |              |
|---------------------|--------------|
| <b>Course Level</b> | Second Cycle |
|---------------------|--------------|

|                    |          |
|--------------------|----------|
| <b>Course Type</b> | Elective |
|--------------------|----------|

|                         |              |
|-------------------------|--------------|
| <b>Mode of delivery</b> | Face to face |
|-------------------------|--------------|

|                           |                       |
|---------------------------|-----------------------|
| <b>Course Coordinator</b> | Prof. Dr. Caner ÇIÇEK |
|---------------------------|-----------------------|

|                    |   |
|--------------------|---|
| <b>Instructors</b> | Prof. Dr. Caner ÇIÇEK<br>Prof. Dr. Ahmet ERDEM<br>Assoc. Prof. Dr. Faruk SOYDUGAN<br>Assoc. Prof. Dr. Esin SOYDUGAN<br>Assist. Prof. Dr. Gülnur GÜN |
|--------------------|---|

|                   |  |
|-------------------|--|
| <b>Assistants</b> |  |
|-------------------|--|

|                          |   |
|--------------------------|---|
| <b>Course Objectives</b> | To understand properties of stellar interior. |
|--------------------------|---|

|                       |  |
|-----------------------|--|
| <b>Course Content</b> | The virial theorem and some consequences; equilibrium of a star; energy transfer mechanisms in star; equation of state for stellar material; nuclear reactions in stellar interiors; polytopic gas spheres; stability of convection; structure of white dwarfs |
|-----------------------|--|

|                                 |  |
|---------------------------------|--|
| <b>Course Learning Outcomes</b> | 1) Interpret internal structure of stars<br>2) Explain energy transport mechanism in stars.<br>3) Solve inner structure equations of stars.<br>4) Analyze advanced research about the internal structure of stars<br>5) Collect observational data and compare with theoretical model. |
|---------------------------------|--|

### WEEKLY COURSE CONTENT

| Week    | Topics                                   | Teaching and Learning Methods and Techniques           | Study Materials |
|---------|--|--|-----------------|
| 1. Week | The virial theorem and some consequences | Lectures, Assignment, Discussion, application Practice |                 |
| 2. Week | Equilibrium of a star                    | Lectures, Assignment, Discussion, application Practice |                 |
| 3. Week | Energy transfer mechanisms in stars      | Lectures, Assignment                                   |                 |

### Quick Access

### Physics (Master)

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### Course Information

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|          |   |  |  |
|----------|---|--|--|
|          |   | , Discussion,<br>application Practice                            |  |
| 4. Week  | .Energy transport via radiation, conduction convection            | Lectures,<br>Assignment,<br>Discussion,<br>application Practice  |  |
| 5. Week  | Nuclear reactions in stellar interiors                            | Lectures,Assignment<br>, Discussion,<br>application Practice     |  |
| 6. Week  | Nuclear reactions in stellar interiors                            | Lectures,Assignment<br>, Discussion,<br>application Practice     |  |
| 7. Week  | Internal structure equations                                      | Lectures,<br>Assignment,<br>Discussion,<br>application Practice  |  |
| 8. Week  | Internal structure equations                                      | Lectures,<br>Assignment,<br>Discussion,<br>application Practice  |  |
| 9. Week  | Midterm exam  | Written, oral exam   |  |
| 10. Week | Practices internal structure equations                            | Lectures,Assignment<br>, Discussion,<br>application Practice     |  |
| 11. Week | The ideal gas and radiation                                       | Lectures,<br>Assignment,<br>Discussion,<br>application Practice  |  |
| 12. Week | Polytopic gas spheres   | Lectures,<br>Assignment,<br>Discussion,<br>application Practice  |  |
| 13. Week | Opacity and the sources of opacity                                | Lectures,<br>,Assignment<br>Discussion,<br>application Practice  |  |
| 14. Week | Comparison of the internal structures of different types of stars | Lectures,<br>Assignment ,<br>Discussion,<br>application Practice |  |
| 15. Week | İnternal structure tables for Models                              | Lectures,<br>Assignment ,<br>Discussion,<br>application Practice |  |
| 16. Week | Final Exam  | Written, oral exam   |  |

## RESOURCES

| Recommended Sources   |
|---|
| Stellar Interior , S. Karaali, İstanbul Üniversitesi Rektörlük Yayın No 4212. Fen Fakültesi Yayın No 249, 1995  |
| Stellar Interiors, Physical Principles, Structure, and Evolution, Series: Astronomy and Astrophysics Library, Hansen, Carl J., Kawaler, Steven D., Trimble, Virginia, 2nd ed., 2004 |
| Stellar Interiors - Physical Principles, Structure, and Evolution, C.J. Hansen, S.D. Kawaler, V.Trimble, Springer, 2004   |

## ASSESSMENT

| Measurement and Evaluation Methods and Techniques |          |            |
|---|----------|------------|
| Midterm Exam (%40), Final Exam (%60)              |          |            |
| In-Term Studies                                   | Quantity | Percentage |
|   |          |            |

|   |                 |                   |
|---|-----------------|-------------------|
| Mid Term Exam 1   | 1               | 40                |
| <b>Total</b>  | 1               | 40                |
| <b>End-Term Studies</b>                                 | <b>Quantity</b> | <b>Percentage</b> |
| Final Exam  | 1               | 60                |
| <b>Total</b>  | 1               | 60                |
| <b>Contribution Of In-Term Studies To Overall Grade</b> |                 | 40                |
| <b>End-Term Studies</b>                                 |                 | 60                |
| <b>Total</b>  |                 | 100               |

### COURSE CATEGORY

| Course Category | Percentage |
|-----------------|------------|
| Core Courses    | % 100      |

### CONTRIBUTION OF COURSE LEARNING OUTCOMES TO PROGRAMME OUTCOMES

| Programme Outcomes | Contribution Level | DK1 | DK2 | DK3 | DK4 | DK5 |
|--------------------|--------------------|-----|-----|-----|-----|-----|
| <u>PY1</u>         | 5                  | 5   | 5   | 5   | 5   | 0   |
| <u>PY2</u>         | 4                  | 4   | 4   | 4   | 4   | 0   |
| <u>PY3</u>         | 4                  | 4   | 4   | 4   | 4   | 0   |
| <u>PY4</u>         | 5                  | 5   | 5   | 5   | 5   | 0   |
| <u>PY5</u>         | 4                  | 4   | 4   | 4   | 4   | 0   |
| <u>PY6</u>         | 5                  | 5   | 5   | 5   | 5   | 0   |
| <u>PY7</u>         | 4                  | 4   | 4   | 4   | 4   | 0   |
| <u>PY8</u>         | 4                  | 4   | 4   | 4   | 4   | 0   |
| <u>PY9</u>         | 4                  | 4   | 4   | 4   | 4   | 0   |
| <u>PY10</u>        | 3                  | 3   | 3   | 3   | 3   | 0   |
| <u>PY11</u>        | 4                  | 4   | 4   | 4   | 4   | 0   |
| <u>PY12</u>        | 5                  | 5   | 5   | 5   | 5   | 0   |
| <u>PY13</u>        | 3                  | 3   | 3   | 3   | 3   | 0   |
| <u>PY14</u>        | 4                  | 4   | 4   | 4   | 4   | 0   |
| <u>PY15</u>        | 4                  | 4   | 4   | 4   | 4   | 0   |

\*DK = Course's Contribution.

|                              | 0    | 1        | 2   | 3    | 4    | 5         |
|------------------------------|------|----------|-----|------|------|-----------|
| <b>Level of contribution</b> | None | Very Low | Low | Fair | High | Very High |

### ECTS CREDITS AND COURSE WORKLOAD

| Event                  | Quantity | Duration (Hour) | Total Workload (Hour) |
|------------------------|----------|-----------------|-----------------------|
| Mid Term Exam 1        | 1        | 2               | 2                     |
| Assignment 1           | 5        | 5               | 25                    |
| Application/Practice   | 14       | 1               | 14                    |
| Final Exam Preparation | 1        | 15              | 15                    |
| Research&Project       | 6        | 2               | 12                    |

|                                  |    |    |      |
|----------------------------------|----|----|------|
| Mid Term Exam Preparation        | 1  | 15 | 15   |
| Assignment 2                     | 16 | 2  | 32   |
| Class Hours (14 weeks)           | 14 | 3  | 42   |
| Final Exam                       | 1  | 2  | 2    |
| Preliminary Study                | 14 | 1  | 14   |
| Further Study                    | 10 | 2  | 20   |
| <b>Total Workload</b>            |    |    | 193  |
| <b>Total Workload / 25.5 (s)</b> |    |    | 7.57 |
| <b>ECTS Credit of the Course</b> |    |    | 8    |