# AYDIN ADNAN MENDERES UNIVERSITY
# COURSE INFORMATION FORM

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|---|---|---|---|---|---|---|---|---|---|
| Course Title | Advanced Module Theory | | | | | | | | |
| Course Code | MTK576 | | Couse Level | Second Cycle (Master's Degree) | | | | | |
| ECTS Credit | 8 | Workload | 200 *(Hours)* | Theory | 3 | Practice | 0 | Laboratory | 0 |
| Objectives of the Course | This course gives the some special concepts of modules | | | | | | | | |
| Course Content | To define Artinian and Noetherian modules and homomorphisms and give some examples of them, to introduce of Hilbert's Basis Theorem, to study on local rings and local endomorphism rings, to study semisimple modules and semisimple rings, to introduce socle and radical concepts, to give properties of regular and semiperfect rings, to study on Quasi-Frobenius rings. | | | | | | | | |
| Work Placement | N/A | | | | | | | | |
| Planned Learning Activities and Teaching Methods | Explanation (Presentation), Individual Study | | | | | | | | |
| Name of Lecturer(s) | | | | | | | | | |

| **Assessment Methods and Criteria** | | |
|---|---|---|
| Method | Quantity | Percentage (%) |
| Midterm Examination | 1 | 30 |
| Final Examination | 1 | 50 |
| Assignment | 1 | 20 |

| **Recommended or Required Reading** | |
|---|---|
| 1 | Moduln und Ringe, F. Kasch, B.G. Teubner Stuttgart 1977. |
| 2 | Modules and Rings, F. Kasch, Translated by D.A.R. Wallace, 1982. |
| 3 | Rings and Categories of Modules, F.W. Anderson- K.R. Fuller, Springer Verlag 1974 |

| Week | Weekly Detailed Course Contents | |
|---|---|---|
| 1 | Theoretical | Artinian and Noetherian modules |
| 2 | Theoretical | Hilbert's Basis Theorem |
| 3 | Theoretical | Decomposition of modules over Noetherian and Artinian modules |
| 4 | Theoretical | Local rings, local endomorphism rings |
| 5 | Theoretical | Krull-Remark-Schmidt Theorem |
| 6 | Theoretical | Semisimple modules and rings |
| 7 | Theoretical | Socle and radical |
| 8 | Intermediate Exam | Midterm exam |
| 9 | Theoretical | Tensor product and flat modules |
| 10 | Theoretical | Regular rings |
| 11 | Theoretical | Semiperfect modules |
| 12 | Theoretical | Nil ideals and t-nilpotent ideals |
| 13 | Theoretical | Injectivity and the cogenerator property of ring |
| 14 | Theoretical | Quasi-Frobenius rings and characterization of Quasi- Frobenius rings |
| 15 | Theoretical | Quasi-Frobenius algebras and characterization of Quasi- Frobenius algebras |
| 16 | Final Exam | Final Exam |

| **Workload Calculation** | | | | |
|---|---|---|---|---|
| Activity | Quantity | Preparation | Duration | Total Workload |
| Lecture - Theory | 14 | 3 | 3 | 84 |
| Assignment | 1 | 20 | 2 | 22 |
| Midterm Examination | 1 | 40 | 2 | 42 |

| | | | | |
|---|---|---|---|---|
| Final Examination | 1 | 50 | 2 | 52 |
| | | | Total Workload (Hours) | 200 |
| | | | [Total Workload (Hours) / 25*] = **ECTS** | 8 |
| **25 hour workload is accepted as 1 ECTS* | | | | |

| **Learning Outcomes** | |
|---|---|
| 1 | To be able to give basic properties in advanced module theory |
| 2 | To be able to relate advanced module theory with related areas in algebra |
| 3 | To be able to develop theoretical techniques in advanced algebra |
| 4 | To be able to develop individual abilities in advanced algebra |
| 5 | To be able to give relations between advanced module theory and related other subject areas |

| **Programme Outcomes** *(Mathematics Master)* | |
|---|---|
| 1 | To be able to have an adequate theoretical and practical domain knowledge. |
| 2 | To be able to comprehend the interdisciplinary interaction associated with Mathematics. |
| 3 | To be able to use theoretical and practical domain knowledge gained in the field of Mathematics. |
| 4 | To be able to interpret knowledge from different disciplines integrating knowledge in the field of mathematics and produce new information. |
| 5 | To be able to define, analyse, model and to solve the problems by scientific methods in Mathematics. |
| 6 | To be able to conduct a math related specialistic study independently. |
| 7 | To be able to develop new strategic approaches to solve problems occurred in unforeseen and complex math-related applications by taking responsibility. |
| 8 | To be able to lead in situations that require solving problems related to the mathematics. |
| 9 | To be able to criticize his/her knowledge and skills acquired in the field mathematics. |
| 10 | To be able to transfer his/her ideas and suggestions for solutions to problems by supporting quantitative or qualitative data verbally and in writing. |
| 11 | To be able to communicate both orally and written in a foreign language. |
| 12 | To be able to use computer hardware and information technologies with software required by Mathematics. |
| 13 | To be able to contribute to the solution of the social, scientific, cultural and ethical problems related to the Mathematics, and being able to support the development of social, scientific, cultural and ethical values. |
| 14 | To be able to develop mathematics-related strategies, policies and operational plans, and to evaluate the results obtained within the framework of quality processes. |
| 15 | To be able to use his/her knowledge in the field of mathematics and practical problem-solving skills in interdisciplinary studies. |

**Contribution of Learning Outcomes to Programme Outcomes** *1:Very Low, 2:Low, 3:Medium, 4:High, 5:Very High*

| | L1 | L2 | L3 | L4 | L5 |
|---|---|---|---|---|---|
| P1 | 4 | 4 | 4 | 4 | 5 |
| P2 | 5 | 5 | 4 | 4 | 5 |
| P3 | | 4 | 4 | 4 | 4 |
| P4 | 4 | 4 | 5 | 4 | 5 |
| P5 | 4 | 3 | 4 | 5 | 4 |
| P6 | 3 | 3 | 3 | 5 | 3 |
| P7 | 2 | 3 | 4 | 5 | 3 |
| P11 | 4 | 4 | 4 | 4 | 4 |
| P15 | 2 | 4 | 4 | 5 | 5 |