



AYDIN ADNAN MENDERES UNIVERSITY COURSE INFORMATION FORM

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|--|---|---|----------------------|--|---|--------------------------------|---|------------|---|
| Course Title | | Micro-Nano Motors, Theories and Applications | | | | | | | |
| Course Code | | KİM670 | | Couse Level | | Third Cycle (Doctorate Degree) | | | |
| ECTS Credit | 8 | Workload | 200 (<i>Hours</i>) | Theory | 3 | Practice | 0 | Laboratory | 0 |
| Objectives of the Course | | The aim of the course is to provide students with a working knowledge of the principles of operation, physical structures, methods of fabrication, properties and applications of Micro- and Nano-motors. | | | | | | | |
| Course Content | | Synthesis of micro / nano motors and comparison with natural molecular machines. Micro / nano motor synthesis methods and characterization. Micro / nano motor types. Movement and control of micro / nano motors. Examples of applications of micro / nano motors. | | | | | | | |
| Work Placement | | N/A | | | | | | | |
| Planned Learning Activities and Teaching Methods | | | | Explanation (Presentation), Discussion, Case Study, Individual Study | | | | | |
| Name of Lecturer(s) | | | | | | | | | |

Assessment Methods and Criteria

| Method | Quantity | Percentage (%) |
|---------------------|----------|----------------|
| Midterm Examination | 1 | 20 |
| Final Examination | 1 | 35 |
| Assignment | 3 | 45 |

Recommended or Required Reading

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| 1 | Lecture notes |
|---|---------------|

| Week | Weekly Detailed Course Contents | |
|------|---------------------------------|--|
| 1 | Theoretical | Introduction to micro / nano science and nanotechnology. Natural micro / nano materials. |
| 2 | Theoretical | Micro / nano electromechanical systems |
| 3 | Theoretical | Protein and DNA based natural molecular machines |
| 4 | Theoretical | Micro / nano motor design and synthesis |
| 5 | Theoretical | Characterization of micro / nano motors |
| 6 | Theoretical | Nanowires |
| 7 | Theoretical | Tubular motors |
| 8 | Theoretical | Janus particles |
| 9 | Theoretical | Examples of other micro / nano motor types |
| 10 | Theoretical | Midterm exam |
| 11 | Theoretical | Movement of micro / nano motors |
| 12 | Theoretical | Directing of micro / nano motors |
| 13 | Theoretical | Medical applications of micro / nano motors |
| 14 | Theoretical | Environmental applications of micro / nano motors |
| 15 | Theoretical | Use of micro / nano motors in energy and communication technologies |
| 16 | Theoretical | Final exam |

Workload Calculation

| Activity | Quantity | Preparation | Duration | Total Workload |
|---------------------------------------|----------|-------------|----------|----------------|
| Lecture - Theory | 14 | 0 | 3 | 42 |
| Assignment | 7 | 0 | 10 | 70 |
| Midterm Examination | 1 | 34 | 2 | 36 |
| 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

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|---|--|
| 1 | To have knowledge about the synthesis and characterization of micro / nano motors. |
| 2 | To have knowledge of micro / nano motor types, motion and control features. |
| 3 | Having knowledge about the energy applications of micro / nano motors. |
| 4 | Having knowledge about the medical applications of micro / nano motors. |
| 5 | Having knowledge about the environmental applications of micro / nano motors. |

Programme Outcomes (Chemistry Doctorate)

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|---|---|
| 1 | Depending on the master degree competences, develops, insights and innovates current and advanced knowledge and/or research in proficiency level. |
| 2 | Gains high skill levels in using research methods in the field of his/her study. |
| 3 | Comprehends the interaction between disciplines related to his/her field. Reaches to original results using his/her expertise in order to analyze, synthesize and evaluate new and complicated ideas. |
| 4 | Enlarges the boundaries of his/her field of knowledge by publishing at least one research paper in national and/or international peer-reviewed journals. |
| 5 | Defends his/her original opinions related to his/her field before authority and communicates effectively illustrating his/her competence. |
| 6 | May communicate and debate written, orally and visually in European Language Portfolio level C1. |
| 7 | Follows the developments in computer software and information and communication technologies developed for his/her research area and uses these in order to solve research problems. |
| 8 | Collaborates for scientific research with national and international research teams. |
| 9 | Contributes to the course of creation and maintenance of knowledge based society and by introducing the scientific, social and cultural developments to the society he/she is living in. |

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 | 5 | 5 | 5 | 5 | 5 |
| P2 | 4 | 4 | 4 | 4 | 4 |
| P3 | 4 | 3 | 3 | 3 | 3 |
| P5 | 4 | 4 | 4 | 4 | 4 |
| P7 | 3 | 3 | 3 | 3 | 3 |

