**AVIATION SCIENCE AND TECHNOLOGY PhD PROGRAMME**

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| **First Year** |
| **I. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501011101 | [THE SCIENTIFIC RESEARCH METHODS AND ITS ETHICS](#C1) | 7.5 | 3+0 | 3 | **C** | Turkish |
| 506711606 | [MOTORLESS FLIGHT PRINCIPLE](#C3) | 7.5 | 3+0 | 3 | **C** | Turkish |
|  | Elective Course-1 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Elective Course-2 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Total of I. Semester  | 30 |  | 12 |  |  |
| **II. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
|  | Elective Course-3 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Elective Course-4 | 7.5 | 3+0 | 3 | E | Turkish |
|  | Elective Course-5 | 7.5 | 3+0 | 3 | E | Turkish |
| 506712001 | PhD Seminar | 7.5 | 0+1 | - | **C** | Turkish |
|  | Total of II. Semester  | 30 |  | 9 |  |  |
|  | TOTAL OF FIRST YEAR | 60 |  | 21 |  |  |

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| **Second Year** |
| **III. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 506711801 | PhD PROFICIENCY | 30 | 0+1 | **-** | **C** | Turkish |
|  | Total of III. Semester | 30 |  |  |  |  |
| **IV. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 501011102 | THESIS PROPOSAL | 30 | 0+1 | **-** | **C** | Turkish |
|  | Total of IV. Semester | 30 |  |  |  |  |
|  | TOTAL OF SECOND YEAR  | 60 |  |  |  |  |

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| **Third Year** |
| **V. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 506711802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 506711803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | **-** | **C** | Turkish |
|  | Total of V. Semester | 30 |  |  |  |  |
| **VI. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 506711802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 506711803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | - | **C** | Turkish |
|  | Total of VI. Semester | 30 |  |  |  |  |
|  | TOTAL OF THIRD YEAR | 60 |  |  |  |  |

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| **Fourth Year** |
| **VII. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 506711802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 506711803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | **-** | **C** | Turkish |
|  | Total of VII. Semester | 30 |  |  |  |  |
| **VIII. Semester** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 506711802 | PhD THESIS STUDY | 25 | 0+1 | **-** | **C** | Turkish |
| 506711803 | SPECIALIZATION FIELD COURSE | 5 | 3+0 | - | **C** | Turkish |
|  | Total of VIII. Semester | 30 |  |  |  |  |
|  | TOTAL OF FOURTH YEAR | 60 |  |  |  |  |

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| **Elective Courses** |
| Code | Course Title | ECTS | T+P | Credit | C/E | Language |
| 506711601 | [MACHINING OF AEROSPACE MATERIALS](#C6) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506711602 | [UNMANNED AERIAL TECHNOLOGIES AND STUDIES](#C5) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506711603 | [ADDITIVE MANUFACTURING AND MATERIALS TECHNOLOGY](#C4) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506711604 | [AIRCRAFT SYSTEMS](#C2) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506711605 | [CORROSION IN AIRCRAFT SYSTEMS](#C11) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506712601 | [AIRCRAFT FUEL SYSTEMS AND EMISSIONS](#C9) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506712602 | [AIRCRAFT ACCIDENT INVESTIGATION METHODOLGY](#C8) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506712603 | [MODELING OF MACHINING TECH.IN AV.USING FIN.EL.MET.](#C10) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506712604 | [NON-TRADITIONAL MANUFACTURING METHODS](#C7) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506712606 | [Machine Learning Applications for Aeronautics](#C12) | 7.5 | 3+0 | 3 | E | TurkIsh |
| 506712605 | AIR TRAFFIC OPTIMIZATION | 7.5 | 3+0 | 3 | E | TurkIsh |

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** |  Joint Course for the Institute | **SEMESTER** |  Fall-Spring |

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| **COURSE** |
| **CODE** |  501011101 | **TITLE** |  The Scientific Research Methods and Its Ethics |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
| MSc- Ph.D | 3  | 0 | 0 | 3+0  | 7,5 | COMPULSORY( X ) | ELECTIVE(   ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
| 1,5 | 1,5 |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 40 |
| Quiz |   |    |
| Homework |   |    |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 60 |
| **PREREQUISITE(S)** |  None |
| **SHORT COURSE CONTENT** | Science, the scientific thought and other fundamental concepts, the scientific research process and its techniques, Methodology: Data Collecting-Analysis-Interpretation, Reporting the scientific research (Preparation of a thesis, oral presentation, article, project), Ethics, Ethics of scientific research and publication.  |
| **COURSE OBJECTIVES** | The main objectives are: To examine the foundations of scientific research and the scientific research methods, to teach the principles of both the methodology and the ethics, to realize the process on a scientific research and to evaluate the results of research, to teach reporting the results of research (on a thesis, presentation, article). |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | Applying the scientific research methods and the ethical rules in their professional life.  |
| **LEARNING OUTCOMES OF THE COURSE** | Gaining awareness on ethical principles at basic research methods, becoming skillful at analyzing and reporting the data obtained in scientific researches, being able to have researcher qualification with occupational sense of responsibility, having the scientific and vocational ethics’ understanding and being able to defend this understanding in every medium. |
| **TEXTBOOK (Turkish)** | Karasar, N. (2015). Bilimsel Araştırma Yöntemi. Nobel Akademi Yayıncılık, Ankara.  |
| **OTHER REFERENCES** | **1-**Büyüköztürk, Ş., Çakmak, E. K., Akgün, Ö. E., Karadeniz, Ş., Demirel, F. (2012). Bilimsel Araştırma Yöntemleri. Pegem Akademi Yayınevi, Ankara. **2-**Tanrıöğen, A. (Editör). (2014). Bilimsel Araştırma Yöntemleri. Anı Yayıncılık, Ankara.**3-**Türkiye Bilimler Akademisi Bilim Etiği Komitesi. Bilimsel Araştırmada Etik ve Sorunları, Ankara: TÜBA Yayınları, (2002).**4-**Ekiz, D. (2009). Bilimsel Araştırma Yöntemleri: Yaklaşım, Yöntem ve Teknikler. Anı Yayıncılık, Ankara.**5-**Day, Robert A. (Çeviri: G. Aşkay Altay). (1996). Bilimsel Makale Nasıl Yazılır ve Nasıl Yayımlanır?, TÜBİTAK Yayınları, Ankara.**6-**Özdamar, K. (2003). Modern Bilimsel Araştırma Yöntemleri. Kaan Kitabevi, Eskişehir.**7-**Cebeci, S. (1997). Bilimsel Araştırma ve Yazma Teknikleri. Alfa Basım Yayım Dağıtım, İstanbul.**8-**Wilson, E. B. (1990). An Introduction to Scientific Research. Dover Pub. Inc., New York.**9-**Çömlekçi, N. (2001). Bilimsel Araştırma Yöntemi ve İstatistiksel Anlamlılık Sınamaları. Bilim Teknik Kitabevi, Eskişehir. |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Science, scientific thought and other basic concepts (University, history of university, higher education, science, scientific thought and other related concepts) |
| 2 | Science, scientific thought and other basic concepts (University, history of university, higher education, science, scientific thought and other related concepts)  |
| 3 | The scientific research and its types (Importance of the scientific research, types of science, scientific approach) |
| 4 | The scientific research process and its techniques (Access to the scientific knowledge, literature search, determining the research issue, definition of the problem, planning)  |
| 5 | The scientific research process and its techniques (Access to the scientific knowledge, literature search, determining the research issue, definition of the problem, planning)  |
| 6 | The scientific research process and its techniques (Access to the scientific knowledge, literature search, determining the research issue, definition of the problem, planning)  |
| 7 | The method and the approach: Collecting, analysis and interpretation of the data (Data, data types, measurement and measurement tools, collecting data, organizing data, summarizing data, analysis and the interpretation of data) |
| 8 | The method and the approach: Collecting, analysis and interpretation of the data (Data, data types, measurement and measurement tools, collecting data, organizing data, summarizing data, analysis and the interpretation of data) |
| 9 | Finalizing the scientific research (Reporting, preparing the thesis, oral presentation, preparing an article and a project) |
| 10 | Finalizing the scientific research (Reporting, preparing the thesis, oral presentation, preparing an article and a project) |
| 11 | Finalizing the scientific research (Reporting, preparing the thesis, oral presentation, preparing an article and a project) |
| 12 | Ethics, scientific research and publication ethics (Ethics, rules of ethics, occupational ethics, non-ethical behaviors) |
| 13 | Ethics, scientific research and publication ethics (Ethics, rules of ethics, occupational ethics, non-ethical behaviors) |
| 14 | Ethics, scientific research and publication ethics (Ethics, rules of ethics, occupational ethics, non-ethical behaviors) |
| 15,16 | Mid-term exam, Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE INSTITUTE’S GRADUATE PROGRAMME’S LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (M.Sc.-Ph.D.)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Having the scientific and vocational ethics’ understanding and being able to defend this understanding in every medium. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | Being able to have researcher qualification with occupational sense of responsibility.  | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Becoming skillful at analyzing and reporting the data obtained in scientific researches. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 4** | Gaining awareness on ethical principles at basic research methods. | **[x]**  | **[ ]**  | **[ ]**  |
| **Prepared by :**  |   | **Date:** |  |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PHd)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  506702505 | **TITLE** |  MACHİNİNG OF AEROSPACE MATERİALS |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **MSc** | 3  |    |    | 3  |     | COMPULSORY(   ) | ELECTIVE( X ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   |   |  30  |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 30 |
| Quiz |   |    |
| Homework |   |    |
| Project |   | 20 |
| Report |   | 10 |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 40 |
| **PREREQUISITE(S)** |        |
| **SHORT COURSE CONTENT** | The materials commonly used in the aviation industry will be introduced and the advanced production methods used with these materials will be explained. |
| **COURSE OBJECTIVES** | Materials commonly used in the aviation industry will be introduced and advanced manufacturing technolgies of aerospace industry will be explained. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Multidisciplinary system students taking the course will have minimum knowledge about the subject and learn the methods of the machining processes. |
| **LEARNING OUTCOMES OF THE COURSE** | Students taking the course will be familiar with the special materials commonly used in the aviation industry and will have information about the technologies used in their processing. |
| **TEXTBOOK** |  Manufacturing prcess M. SCHEY Aerospace manufacturing processes Pradip K. SAHA |
| **OTHER REFERENCES** |  ----- |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Aviation Materials (Aluminum, Titanium, Superalloys…) |
| 2 |   Aviation Materials (Aluminum, Titanium, Superalloys…) |
| 3 |   Machining Theory |
| 4 |   Traditional cutting tools used in Machining |
| 5 |   Experimental methods used in Machining |
| 6 |   Experimental methods used in Machining |
| 7 |   Numerical modeling of machining processes |
| 8 |   Numerical modeling of machining processes |
| 9 |   Abrasive Manufacturing Methods |
| 10 |   Chemical-based Manufacturing Methods |
| 11 |   The concept of surface integrity |
| 12 |   Quality Control Methods |
| 13 |   Innovative Manufacturing Methods |
| 14 |   Innovative Manufacturing Methods |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY MSc PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Ability to access information in Aviation Science and Technologies in a scientific manner in depth and in width as well as to access, interpret and use the information obtained. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The synthesizing ability of the different information gathered from different disciplines in the framework of nanoscience and nanotechnology. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 3** | Ability to work effectively in inter or multi-disciplinary teams, proficiency of interdependence. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Designing ability of the complex system, process equipment or product under the realistic constraints and conditions by developing the novel strategic approaches. | **[x]**  | **[x]**  | **[ ]**  |
| **LO 5** | Ability to develop new or original ideas to design complex systems or processes and to come up with innovative/alternative solutions. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Awareness of life-long learning ability to reach information follow developments in science and technology and continuous self improvement. | **[x]**  | **[x]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in a foreign language. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 8** | Ability of effective usage of the information technologies. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 9** | Understanding of professional and ethical issues. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 10** | Knowledge of social, environmental, health, safety and judicial dimensions of Aviation Science and Technologies applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | **[x]**  | **[ ]**  | **[ ]**  |
| **Prepared by :**  |  Dr. Fatih Hayati ÇAKIR | **Date:** |  May 21 2020 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (MSc)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |        | **TITLE** |  UNMANNED AERIAL TECHNOLOGIES AND STUDIES |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **MSc** | 3  | 0  | 0  | 3  | 7,5 | COMPULSORY(   ) | ELECTIVE( X ) | TURKISH |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
| 0 | 3 |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 20 |
| Quiz |   |    |
| Homework | 2 | 20 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 40 |
| **PREREQUISITE(S)** |        |
| **SHORT COURSE CONTENT** |  To explain the subsystems of unmanned aircraft and introducing the application areas |
| **COURSE OBJECTIVES** |  Training subject of aerodynamics and avionics in UAV subststem |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  To learn UAV design and UAV avionics systems for Engineer-based students. |
| **LEARNING OUTCOMES OF THE COURSE** |  Aircraft Design Methodology; Mission profiles, Competitor Study; Aircraft First Weight Estimates and Initial Sizing; Estimation of Critical Performance Parameters; Wing loading, Weight/propulsion ratio, Configuration Plan; Body configuration selection, Tail configuration selection, Landing kit configuration selection, Propeller configuration selection, Propulsion Systems, Performance Analysis; Range and durability, Landing and departure distances, maneuverability, Flight Stability and Control; Longitudinal stability, Lateral stability, Control surfaces, Cost Analysis; Flight Safety and Flight Compatibility Documents  |
| **TEXTBOOK** |  Austin R., (2010). Unmanned Aircraft Systems, UAVS Design, Development and Deployment, Wiley, Chichester, West Sussex, United Kingdom. |
| **OTHER REFERENCES** |  Gundlach J., (2012). Designing Unmanned Aircraft Systems – A comprehensive approach, Reston, VA: American Institute of Aeronautics and Astronautics . |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 |  UAV course introduction |
| 2 |  UAV design |
| 3 |  UAV design |
| 4 |  UAV Body configuration selection |
| 5 |  UAV Body configuration selection |
| 6 | Midterm Examination 1 |
| 7 |  UAV Tail configuration selection |
| 8 |  UAV Landing kit configuration selection |
| 9 |  UAV Propeller configuration selection |
| 10 |  UAV Propulsion Systems |
| 11 | Midterm Examination 2 |
| 12 |  UAV Performance Analysis |
| 13 |  UAV Cost Analysis |
| 14 |  Flight Safety and Flight Compatibility Documents  |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY MSc PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Ability to access information in Aviation Science and Technologies in a scientific manner in depth and in width as well as to access, interpret and use the information obtained. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The synthesizing ability of the different information gathered from different disciplines in the framework of nanoscience and nanotechnology. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to work effectively in inter or multi-disciplinary teams, proficiency of interdependence. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 4** | Designing ability of the complex system, process equipment or product under the realistic constraints and conditions by developing the novel strategic approaches. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 5** | Ability to develop new or original ideas to design complex systems or processes and to come up with innovative/alternative solutions. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Awareness of life-long learning ability to reach information follow developments in science and technology and continuous self improvement. | **[ ]**  | **[ ]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in a foreign language. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 8** | Ability of effective usage of the information technologies. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 9** | Understanding of professional and ethical issues. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 10** | Knowledge of social, environmental, health, safety and judicial dimensions of Aviation Science and Technologies applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | **[x]**  | **[ ]**  | **[ ]**  |
| **Prepared by :**  |        | **Date:** |        |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |        | **TITLE** |  Additive manufacturing and materials technology |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | 0  | 0  | 3  | 5 | COMPULSORY(   ) | ELECTIVE( x ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
| x | x |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm |   |    |
| Quiz |   |    |
| Homework | 2 | 40 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 60 |
| **PREREQUISITE(S)** |  No |
| **SHORT COURSE CONTENT** |  Additive Manufacturing (AM) will have an important place in the 4th Industrial Revolution concept. In this context, these technologies will be explained to the students within the scope of this course. |
| **COURSE OBJECTIVES** |  Additive manufacturing (AM) and materials used in this field will be gained to students |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Within the scope of the doctoral course, they will have seen the latest technologies in the field of aviation science and technologies. |
| **LEARNING OUTCOMES OF THE COURSE** |  1- Will have information about AM and material technologies used in this field.Understand the programs used in the 2-Apply and analyze using AM manufacturing 3-AM softrware 4-They will be able to evaluate and synthesize the parts to be produced with which AM method. |
| **TEXTBOOK** |  Additive Manufacturing Technologies: 3D Printing, Rapid Prototyping, and Direct Digital Manufacturing   ,Ian Gibson, David Rosen, Brent Stucker, springer, second edition |
| **OTHER REFERENCES** |  projection, PC. |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 |  Introduction to AM and its basics |
| 2 |  Additive manufacturing (FDM) |
| 3 |  Additive manufacturing (Stereo-lithography, ink-jet printing)  |
| 4 |  Additive manufacturing (LAM (SLM/ DMLS/ Laser Cusing/SLS) |
| 5 |  Additive manufacturing (Laser Cladding (LMD/LENS/DMD/DLD) |
| 6 |  Additive manufacturing (EBM) |
| 7 |  Midterm |
| 8 |  3d software |
| 9 |  3d software |
| 10 |  Slicing methods |
| 11 |  Slicing methods |
| 12 |  Materials used in AM |
| 13 |  Presentation |
| 14 |  Presentation |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Understanding the interdisciplinary interactions in Aviation Science and Technologies; getting original results by using the professional knowledge in the analysis of the novel and complex ideas, synthesis and evaluations. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 2** | Developing novel technique, design and application in Aviation Science and Technologies or extending the known technique, design and application to different area. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to determine, identify, formulize and solve complex engineering/pure science problems by selecting and applying convenient analysis and modeling methods. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability being a leader in solving problems related with Aviation Science and Technologies. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Publishing at least one paper related with Aviation Science and Technologies in national and/or international journals and extending the limits of knowledge. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 6** | Ability of high level criticizing and proposing alternatives in the professional subjects. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in Turkish; advanced proficiency in at least one foreign language. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 8** | Contribution to the solutions of social, scientific, cultural and ethical problems encountered in the applications of Aviation Science and Technologies, and supporting of the related developments. | **[ ]**  | **[x]**  | **[ ]**  |
| **Prepared by :**  |  Doç.Dr.Mustafa Özgür Öteyaka | **Date:** |  22.05.2020 |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |        | **TITLE** |  motorless flight principle |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | 0  | 0  | 0  | 7,5 | COMPULSORY( x ) | ELECTIVE(   ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   | x |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 10 |
| Quiz |   |    |
| Homework |   |    |
| Project | 1 | 60 |
| Report |   |    |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 30 |
| **PREREQUISITE(S)** |        |
| **SHORT COURSE CONTENT** |  Glider, how glider flies, forces affecting glider, glider's aerodynamics, glider's take-off and landing, glider's classes, indicators and cockpit |
| **COURSE OBJECTIVES** |  • Introduction of Glider Body• To recognize the technological developments reflected in the civil sector with these applications.• As an engineer, to be able to make new designs and perceive existing developments in the light of these developments.• To know the industrial facilities in the sector and to have information about their possibilities, thus to establish the relationship between the subjects seen and learned in the course and the subjects in the industry. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  • Student recognizes the latest developments in aviation industry Technologies• Uses the techniques of accessing, sharing and transmitting information as a requirement of engineering in the information age• Learns the aviation industry of our country• Learns the status of aviation-space technologies in the world.• Improves the design capability for products developed and possible with the existing technologies. |
| **LEARNING OUTCOMES OF THE COURSE** |  Doctorate student completing this course; Have sufficient knowledge about the glider body and other structural parts, sufficient information about the engine and minimal design of an aircraft.In addition, in case of working in the sector, it becomes advantageous in terms of knowledge both in job interviews and in the workplace compared to other mechanical engineers. Student recognizes the latest developments in aviation industry technologies. Write at least 4 learning outcomes for the course. Write learning outcomes with verbs for "knowledge", "comprehension", "practice", "analysis", "synthesis" and "evaluation". |
| **TEXTBOOK** |  Uçak Tasarım Projeleri, LLYOD R., JENKINSON |
| **OTHER REFERENCES** |  Recent Advantages in Aircraft technologies, Ramesh K. AgarwalHandbook of Material Failure Anakysis With Case Studies fron the aerospace and Automotive Industries, Abdel Salam Hamdy Makhlouf |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 |  What is glider and its history |
| 2 |  How glider flies and acting forces |
| 3 |  Glider aerodynamics |
| 4 |  Take Off and Landing of the Glider |
| 5 |  Classes of glider |
| 6 |  Uçuş göstergeleri |
| 7 |  gliding in the world and Turkey |
| 8 |  Midterm |
| 9 |  Design and presentations |
| 10 |  Design and presentations |
| 11 |  Design and presentations |
| 12 |  Design and presentations |
| 13 |  Design and presentations |
| 14 |  Design and presentations |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Understanding the interdisciplinary interactions in Aviation Science and Technologies; getting original results by using the professional knowledge in the analysis of the novel and complex ideas, synthesis and evaluations. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | Developing novel technique, design and application in Aviation Science and Technologies or extending the known technique, design and application to different area. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to determine, identify, formulize and solve complex engineering/pure science problems by selecting and applying convenient analysis and modeling methods. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability being a leader in solving problems related with Aviation Science and Technologies. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Publishing at least one paper related with Aviation Science and Technologies in national and/or international journals and extending the limits of knowledge. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Ability of high level criticizing and proposing alternatives in the professional subjects. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in Turkish; advanced proficiency in at least one foreign language. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 8** | Contribution to the solutions of social, scientific, cultural and ethical problems encountered in the applications of Aviation Science and Technologies, and supporting of the related developments. | **[x]**  | **[ ]**  | **[ ]**  |
| **Prepared by :**  |        | **Date:** |        |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |        | **TITLE** |  Aircraft Systems |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | 0  | 0  | 3  | 7,5 | COMPULSORY(   ) | ELECTIVE( X ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   | X |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 20 |
| Quiz |   |    |
| Homework | 1 | 30 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |        |
| **SHORT COURSE CONTENT** |  Within the scope of the course, aircraft systems will be transferred in modern aircraft. Information will be given about flight and operations of aircraft with high technology products. Detailed information will be given on; Aircraft Fuselage and Wing Structures, Aircraft Hydraulic Systems, Landing Gear, Aircraft wheels and Tires, Flight Control Surfaces, Aircraft Pneumatic Systems, Aircraft Pressurization Systems, Ice and Rain Prevention Systems, Aircraft Oxygen Systems, Aircraft Fire Detection and Prevention Systems, Aircraft Fuel Systems, Piston Engines and Systems Used in Aviation, Gas Turbine Engines and Systems Used in Aviation, Aircraft Indication Systems and Commercial Passenger Aircraft. |
| **COURSE OBJECTIVES** |  Students taking the course will learn high-tech aircraft and systems in detail and analyze the systems used in aviation. They have detailed information about aircraft systems and components and can develop projects on aircraft systems. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Students taking the course will provide job opportunities in many private airlines, especially Turkish Airlines. Academic staff can produce projects and publications about aircraft systems. |
| **LEARNING OUTCOMES OF THE COURSE** |  outcomes for the course: “information "," comprehension "," understanding ", synthesis" and "evaluation” |
| **TEXTBOOK** |  Airframe and Systems (CAE Oxford),  |
| **OTHER REFERENCES** |  Current articles and publications on topicsAirframe and  |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 |  Airframe and Wing Structures,  |
| 2 |  Aircraft Hydraulic Systems,  |
| 3 |  Landing Gear, Aircraft wheels and Tires |
| 4 |  Flight Control Surfaces |
| 5 |  Aircraft Pneumatic Systems,  |
| 6 |  Aircraft Pressurization Systems |
| 7 |  Ice and Rain Prevention Systems |
| 8 |  Aircraft Oxygen Systems |
| 9 |  Aircraft Fire Detection and Prevention Systems |
| 10 |  Aircraft Fuel Systems |
| 11 |  Piston Engines and Systems Used in Aviation |
| 12 |  Gas Turbine Engines and Systems Used in Aviation |
| 13 |  Aircraft Indication Systems  |
| 14 |  Commercial Passenger Aircraft Genaral |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Understanding the interdisciplinary interactions in Aviation Science and Technologies; getting original results by using the professional knowledge in the analysis of the novel and complex ideas, synthesis and evaluations. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | Developing novel technique, design and application in Aviation Science and Technologies or extending the known technique, design and application to different area. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to determine, identify, formulize and solve complex engineering/pure science problems by selecting and applying convenient analysis and modeling methods. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability being a leader in solving problems related with Aviation Science and Technologies. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Publishing at least one paper related with Aviation Science and Technologies in national and/or international journals and extending the limits of knowledge. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Ability of high level criticizing and proposing alternatives in the professional subjects. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in Turkish; advanced proficiency in at least one foreign language. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 8** | Contribution to the solutions of social, scientific, cultural and ethical problems encountered in the applications of Aviation Science and Technologies, and supporting of the related developments. | **[x]**  | **[ ]**  | **[ ]**  |
| **Prepared by :**  |        | **Date:** |        |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PHd)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |  506702505 | **TITLE** | NON-TRADITIONAL MANUFACTURING METHODS |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  |    |    | 3  |     | COMPULSORY(   ) | ELECTIVE( X ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   |   |  30  |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 30 |
| Quiz |   |    |
| Homework |   |    |
| Project |   | 20 |
| Report |   | 10 |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 40 |
| **PREREQUISITE(S)** |  NONE |
| **SHORT COURSE CONTENT** | Unconventional manufacturing methods commonly used in the aviation industry will be explained, and their basic working principles and advantages and limits will be explained. |
| **COURSE OBJECTIVES** |  |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | The students taking the course will be familiar with the advanced manufacturing methods commonly used in the aviation industry and have knowledge of the technologies used in their processing. |
| **LEARNING OUTCOMES OF THE COURSE** |  |
| **TEXTBOOK** |  Manufacturing process M. SCHEY Aerospace manufacturing processes Pradip K. SAHA |
| **OTHER REFERENCES** |  ----- |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Introduction to Non-Conventional Manufacturing |
| 2 | Electro Discharge Machining (EDM) |
| 3 | Chemical Machining (CM) |
| 4 | Electrochemical Machining (ECM) |
| 5 | Ultrasonic Machining (USM) |
| 6 | Ultrasonic Assisted Machining (UASM) |
| 7 | Laser–Beam Machining (LBM) |
| 8 | Midterm Weak |
| 9 | Water Jet Cutting |
| 10 | Laser Cutting |
| 11 | Shot Peening |
| 12 | Plasma Plating |
| 13 | Advanced Surface Polishing |
| 14 | Plating for repair and maintenance |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Understanding the interdisciplinary interactions in Aviation Science and Technologies; getting original results by using the professional knowledge in the analysis of the novel and complex ideas, synthesis and evaluations. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | Developing novel technique, design and application in Aviation Science and Technologies or extending the known technique, design and application to different area. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 3** | Ability to determine, identify, formulize and solve complex engineering/pure science problems by selecting and applying convenient analysis and modeling methods. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability being a leader in solving problems related with Aviation Science and Technologies. | **[x]**  | **[x]**  | **[ ]**  |
| **LO 5** | Publishing at least one paper related with Aviation Science and Technologies in national and/or international journals and extending the limits of knowledge. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Ability of high level criticizing and proposing alternatives in the professional subjects. | **[x]**  | **[x]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in Turkish; advanced proficiency in at least one foreign language. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 8** | Contribution to the solutions of social, scientific, cultural and ethical problems encountered in the applications of Aviation Science and Technologies, and supporting of the related developments. | **[x]**  | **[ ]**  | **[ ]**  |
| **Prepared by :**  |  Dr. Fatih Hayati ÇAKIR | **Date:** |  Nov 26 2020 |

**Signature**:

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**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PhD)** | **SEMESTER** |  |

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| **COURSE** |
| **CODE** |  | **TITLE** | Aircraft Accident Investigation Methodology |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
| **PhD** | 3 | 0 | 0 | 3 | 7,5 | COMPULSORY( x ) | ELECTIVE(   ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   | x |    |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 30 |
| Quiz |   |    |
| Homework | 1 | 20 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |       |
| **SHORT COURSE CONTENT** | Within the scope of this course, how to analyze plane crashes in accordance with a certain methodology, how to determine the causes of crashes, how to determine the measures that can be taken to prevent accidents from happening again. Information will be given and examples will be given. |
| **COURSE OBJECTIVES** | Gaining the competence to make aircraft accident analysis in accordance with a methodology and to evaluate the results |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | An engineer who will work in the aviation industry's aircraft accident analysis; It will contribute to all matters that an aircraft crash-accident investigation needs to know and examine in all processes from the crash site to reporting and taking measures. |
| **LEARNING OUTCOMES OF THE COURSE** | The students who will work in the aviation industry;1-Learns about aircraft crashes and types. 2- Determines the preliminary preparations for accident investigation. 3- Understands the accident analysis methods of aircraft, engines and other systems. 4- Evaluates the factors affecting the accident.5- Prepare the accident report. 6- It determines the measures that can be taken, evaluates and publishes them as a report. |
| **TEXTBOOK** | 1. Doc 9756-AN/965:Manual of Aircraft Accident and Incident Investigation Part III — Investigation |
| **OTHER REFERENCES** | F16 Aircraft Accident Investigation Data H.V. Lachapella. J79 Accident Invesigation Training Manual J85-GE-21 Turbojet Engine Accident Invesigation Procedures |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Aircraft Accident-Crush Invesigation Procedures |
| 2 | Data collection before Aircraft Accident-Crush Invesigation |
| 3 | Examination of Aircraft Accident-Crush Area |
| 4 | Investigation of Aircraft, Engines and Sub-Systems’ Materials in accident-crushing field |
| 5 | Examination of Aircraft, Engines and Subsystem Materials in workshop conditions |
| 6 | Midterm Examination 1 |
| 7 | Investigation of Aircraft, Engines and Sub-Systems’ Materials in test shop and laboratory conditions |
| 8 | Determination of possible causes of aircraft accident |
| 9 | Determining the probable causes based on obtained investigation data |
| 10 | Preparing a preliminary report |
| 11 | Homework |
| 12 | Publication of Aircraft Investigation Report |
| 13 | Determination of the measures and precautions to be taken about aircraft accident. |
| 14 | Examples of previously occured Aircraft Accidents  |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGYMSc PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (MSc)** | **3**High | **2**Mid | **1**Low |
| **LO 1** | Ability to access information in Aviation Science and Technologies in a scientific manner in depth and in width as well as to access, interpret and use the information obtained. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | The synthesizing ability of the different information gathered from different disciplines in the framework of nanoscience and nanotechnology. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to work effectively in inter or multi-disciplinary teams, proficiency of interdependence. | **[x]**  | **[x]**  | **[ ]**  |
| **LO 4** | Designing ability of the complex system, process equipment or product under the realistic constraints and conditions by developing the novel strategic approaches. | **[ ]**  | **[ ]**  | **[ ]**  |
| **LO 5** | Ability to develop new or original ideas to design complex systems or processes and to come up with innovative/alternative solutions. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 6** | Awareness of life-long learning ability to reach information follow developments in science and technology and continuous self improvement. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in a foreign language. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 8** | Ability of effective usage of the information technologies. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 9** | Understanding of professional and ethical issues. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 10** | Knowledge of social, environmental, health, safety and judicial dimensions of Aviation Science and Technologies applications, knowledge of project management and workplace practices in the field as well as the awareness of limitations that such factors impose on the practices. | **[x]**  | **[ ]**  | **[ ]**  |
| **Prepared by :** | Assoc.Prof.Dr. Özgür BALLI | **Date:** |       |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |        | **TITLE** |  Aircraft Fuel Systems and Emission |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | -  | -  | 3  | 7,5 | COMPULSORY(   ) | ELECTIVE( x ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   |   |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm | 1 | 40 |
| Quiz |   |    |
| Homework |   |    |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 60 |
| **PREREQUISITE(S)** |  There is no prerequisite or co-requisite for this course. |
| **SHORT COURSE CONTENT** |  Within the scope of the course, it will be learned what the fuels used in aircraft are, how these fuels are stored on the aircraft and how they are transferred from these tanks, and in addition to these, information about the environmental effects and emissions of fuels will be given. In addition to these systems, information will be given about fire extinguishing systems in case of fire. |
| **COURSE OBJECTIVES** |  Introduction of fuel systems and fuels used in gas turbine and piston engines. Introducing the fuel tanks and the necessary special effects of aircraft engine emissions on the environment and the work done to reduce them, to raise awareness of the measures taken. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  To develop knowledge and criticism ability about fuels and fuel systems used in aircraft. To raise awareness about emission reduction methods. |
| **LEARNING OUTCOMES OF THE COURSE** |  1- Will be able to explain the fuel types and properties used in aircraft.2- Will be able to explain aircraft fuel systems.3- Will be able to explain the concept of emission.4- Will be able to explain fire extinguishing systems. |
| **TEXTBOOK** |  Langton, R., Richards, L., Hewitt, M., & Clark, C. (2009). Aircraft fuel systems. Chichester, U.K.: Wiley. doi:10.1002/9780470059470 |
| **OTHER REFERENCES** |        |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 |  Fuels used in Aircraft |
| 2 |  Fuel System in Piston Engines used in Aircrafts |
| 3 |  Fuel System in Piston Engines used in Aircrafts |
| 4 |  Fuel System in Gas Turbine Engines |
| 5 |  Fuel System in Gas Turbine Engines |
| 6 |  System structure, fuel tanks, supply systems |
| 7 |  Fuel drain, vent and drain |
| 8 |  Cross feed and transfer, indicator and warnings |
| 9 |  Refueling and draining fuel from the aircraft |
| 10 |  Center of gravity control |
| 11 |  Aircraft Emission Types; Rules and Guidelines Related to Environmental Impacts  |
| 12 |  Emission Reduction Techniques in Aircraft Engines |
| 13 |  Fire Extinguishing Systems |
| 14 |  Fire Extinguishing Systems |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Understanding the interdisciplinary interactions in Aviation Science and Technologies; getting original results by using the professional knowledge in the analysis of the novel and complex ideas, synthesis and evaluations. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | Developing novel technique, design and application in Aviation Science and Technologies or extending the known technique, design and application to different area. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to determine, identify, formulize and solve complex engineering/pure science problems by selecting and applying convenient analysis and modeling methods. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 4** | Ability being a leader in solving problems related with Aviation Science and Technologies. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 5** | Publishing at least one paper related with Aviation Science and Technologies in national and/or international journals and extending the limits of knowledge. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 6** | Ability of high level criticizing and proposing alternatives in the professional subjects. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in Turkish; advanced proficiency in at least one foreign language. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 8** | Contribution to the solutions of social, scientific, cultural and ethical problems encountered in the applications of Aviation Science and Technologies, and supporting of the related developments. | **[ ]**  | **[x]**  | **[ ]**  |
| **Prepared by :**  |  Asst. Prof. Dr. Haşim KAFALI | **Date:** |        |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |        | **TITLE** |  MODELING OF MACHINING TECHNIQUES IN AVIATION USING FINITE ELEMENT METHOD |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  | -  | -  | 3  | 7,5 | COMPULSORY(   ) | ELECTIVE( \* ) | TURKISH |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   | \* |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm |   |    |
| Quiz |   |    |
| Homework |   |    |
| Project | 1 | 50 |
| Report |   |    |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 50 |
| **PREREQUISITE(S)** |  - |
| **SHORT COURSE CONTENT** |  It is about the modeling of machining methods using FEM. |
| **COURSE OBJECTIVES** |  The aim of the course is to give students the ability to model machining methods using FEM. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  It will contribute to tool design and machining mechanics.    |
| **LEARNING OUTCOMES OF THE COURSE** |  Modeling of machining operations with finite elements, Analysis of machining operations with finite elements, Basic knowledge of machining mechanics, Evaluation of the results of machining operations. |
| **TEXTBOOK** |  Markopoulos A.P. (2013) Finite Element Method in Machining Processes. |
| **OTHER REFERENCES** |  Groover, M.P. (2016),Modern İmlalatın Prensipleri, Altıntaş, Y. (2000) Metal Cutting Mechanics, Machine Tool Vibrations And Cnc Design, DEFORM Tutorials, ThirdWave Advantedge Tutorials.  |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 |  Introduction to finite element modeling for machining            |
| 2 |  Basics of finite element modeling of orthogonal machining |
| 3 |  Finite element prediction of machining characteristics |
| 4 |  Finite element prediction of surface integrity characteristics |
| 5 |  Input models and parameters for machining and surface integrity characteristics |
| 6 |  Input models and materials and sources of error |
| 7 |  Intrıduction of DEFORM software. |
| 8 |  Intrıduction of THIRDWAVE ADVANTEDGE software. |
| 9 |  DEFORM 2D Machining |
| 10 |  THIRDWAVE ADVANTEDGE 2D Machining |
| 11 |  DEFORM 3D Machining |
| 12 |  DEFORM 3D Machining |
| 13 |  THIRDWAVE ADVANTEDGE 3D Machining |
| 14 |  THIRDWAVE ADVANTEDGE 3D Machining |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Understanding the interdisciplinary interactions in Aviation Science and Technologies; getting original results by using the professional knowledge in the analysis of the novel and complex ideas, synthesis and evaluations. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | Developing novel technique, design and application in Aviation Science and Technologies or extending the known technique, design and application to different area. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to determine, identify, formulize and solve complex engineering/pure science problems by selecting and applying convenient analysis and modeling methods. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 4** | Ability being a leader in solving problems related with Aviation Science and Technologies. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 5** | Publishing at least one paper related with Aviation Science and Technologies in national and/or international journals and extending the limits of knowledge. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 6** | Ability of high level criticizing and proposing alternatives in the professional subjects. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in Turkish; advanced proficiency in at least one foreign language. | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 8** | Contribution to the solutions of social, scientific, cultural and ethical problems encountered in the applications of Aviation Science and Technologies, and supporting of the related developments. | **[ ]**  | **[ ]**  | **[x]**  |
| **Prepared by :**  |        | **Date:** |        |

**Signature**:

**T.R.**

**ESKISEHIR OSMANGAZI UNIVERSITY**

**GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES**

**COURSE INFORMATION FORM**

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PhD)** | **SEMESTER** |   |

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| **COURSE** |
| **CODE** |        | **TITLE** |  Corrosion in aircraft systems |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
|  **PhD** | 3  |    |    | 3  | 5 | COMPULSORY(   ) | ELECTIVE( x ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (√)]** |
|   | x |      |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution** **( % )** |
| Midterm |   |    |
| Quiz |   |    |
| Homework | 1 | 40 |
| Project |   |    |
| Report |   |    |
| Seminar |   |    |
| Other (     ) |   |    |
| **Final Examination** | 60 |
| **PREREQUISITE(S)** |  No |
| **SHORT COURSE CONTENT** |  Corrosion mechanisms, type of corrosion and prevention of corrosion in aircraft systems |
| **COURSE OBJECTIVES** |  The aim of the course is to teach the corrosion protection of the parts used in aircraft systems, the correct material selection against corrosion, corrosion types and mechanisms. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** |  Within the scope of the course, they will have information about corrosion and corrosion prevention in aircraft systems. |
| **LEARNING OUTCOMES OF THE COURSE** |  1- Description of corrosion and mechanisms2- To be able to analyze the types of corrosion3- Evaluation of corrosion coating materials4- Ability to choose materials against corrosion.      |
| **TEXTBOOK** |  1- Mühendisler için korozyon, PROF.DR. HAYRİ YALÇIN - DOÇ.DR. TİMUR KOÇ,ISBN 975-395-269-4, 321, Ankara.2- KOROZYON VE ÖNLENMESİ, Prof.Dr.Saadet Üneri, korozyon derneği. 3 baskı, 442. |
| **OTHER REFERENCES** |  1- KOROZYON TERİMLERİ SÖZLÜĞÜ, Prof.Dr.Saadet Üneri, Anakara 2-METALİK MALZEMELER VE KOROZYON, Prof. Dr. Mustafa Doruk, Anakra  |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 |  Corrosion definition |
| 2 |  Corrosive environments |
| 3 |  Corrosion mechanisms |
| 4 |  Type of corrosion |
| 5 |  Type of corrosion |
| 6 |  Engineering materials and corrosion |
| 7 |  Midterm |
| 8 |  Paints and their applications |
| 9 |  Cathodic protection and its applications |
| 10 |  Metallic materials used in aircraft systems |
| 11 |  Corrosion in aircraft systems |
| 12 |  Prevention of corrosion in aircraft systems |
| 13 |  Scientific Research, Reporting and Presentation |
| 14 |  Scientific Research, Reporting and Presentation |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)**  | **3**High | **2**Mid | **1**Low |
| **LO 1** | Understanding the interdisciplinary interactions in Aviation Science and Technologies; getting original results by using the professional knowledge in the analysis of the novel and complex ideas, synthesis and evaluations. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 2** | Developing novel technique, design and application in Aviation Science and Technologies or extending the known technique, design and application to different area. | **[x]**  | **[ ]**  | **[ ]**  |
| **LO 3** | Ability to determine, identify, formulize and solve complex engineering/pure science problems by selecting and applying convenient analysis and modeling methods. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 4** | Ability being a leader in solving problems related with Aviation Science and Technologies. | **[ ]**  | **[ ]**  | **[x]**  |
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| **LO 6** | Ability of high level criticizing and proposing alternatives in the professional subjects. | **[ ]**  | **[x]**  | **[ ]**  |
| **LO 7** | Ability to communicate in written and oral forms in Turkish; advanced proficiency in at least one foreign language. | **[ ]**  | **[ ]**  | **[x]**  |
| **LO 8** | Contribution to the solutions of social, scientific, cultural and ethical problems encountered in the applications of Aviation Science and Technologies, and supporting of the related developments. | **[ ]**  | **[ ]**  | **[x]**  |
| **Prepared by :**  |  Assoc.Prof.Dr. Mustafa Özgür Öteyaka | **Date:** |  23.06.2021 |

**Signature**:

T.R.

ESKISEHIR OSMANGAZI UNIVERSITY GRADUATE SCHOOL OF NATURAL AND APPLIED SCIENCES

COURSE INFORMATION FORM

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| **DEPARTMENT** | **AVIATION SCIENCE AND TECHNOLOGY (PhD)** | **SEMESTER** | Spring |

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| **COURSE** |
| **CODE** | 506712606 | **TITLE** | Machine Learning Applications for Aeronautics |

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| **LEVEL** | **HOUR/WEEK** | **Credit** | **ECTS** | **TYPE** | **LANGUAGE** |
| **Theory** | **Practice** | **Laboratory** |
| **PhD** | 2 | 1 | x | 3 | 7.5 | COMPULSORY( ) | ELECTIVE( x ) | Turkish |
| **CREDIT DISTRIBUTION** |
| **Basic Science** | **Basic Engineering** | **Knowledge in the discipline****[if it contains considerable design content, mark with (****)]** |
| X | X | 1 √ |
| **ASSESSMENT CRITERIA** |
| **SEMESTER ACTIVITIES** | **Evaluation Type** | **Number** | **Contribution ( % )** |
| Midterm | 1 | 40 |
| Quiz |  |  |
| Homework |  |  |
| Project | 1 | 60 |
| Report |  |  |
| Seminar |  |  |
| Other ( ) |  |  |
| **Final Examination** |  |
| **PREREQUISITE(S)** | Programming Knowledge, English |
| **SHORT COURSE CONTENT** | Machine Learning Basics, Python Basics, Regression, Classification, Ensemble Learning, Clustering, Artificial Neural Networks, Aeronautics Applications |
| **COURSE OBJECTIVES** | The aim of this course is to teach machine learning algorithms such as supervised learning, unsupervised learning and deep learning to apply in aeronautics area. |
| **COURSE CONTRIBUTION TO THE PROFESSIONAL EDUCATION** | To teach and design the machine learning algorithms by using datasets in aeronautics area. |
| **LEARNING OUTCOMES OF THE COURSE** | To learn Python basics. To understand the relationship between data samples by using regression algorithms. To classify the data with classification algorithms. Clustering the data with unsupervised learning. To relate the nonlinear mapping between input and output of artificial neural networks. To apply algorithms and analyze the data on aeronautics dataset such as sample FDR (fligt data recorder). |
| **TEXTBOOK** | 1. Mitchell, Tom M., Machine Learning, McGraw Hill, (1997),<http://www.cs.cmu.edu/~tom/mlbook.html>
2. Simon Rogers and Mark Girolami, A First Course in Machine Learning, Chapman& Hall / CRC, (2012)
 |
| **OTHER REFERENCES** | Ian Goodfellow and Yoshua Bengio and Aaron Courville, Deep Learning, MIT Press, (2016)https://[www.deeplearningbook.org/](http://www.deeplearningbook.org/) |

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| **COURSE SCHEDULE (Weekly)** |
| **WEEK** | **TOPICS** |
| 1 | Bacis Concepts: Artificial Intelligence, Machine Learning,Deep Learning, Supervised Learning, Unsupervised Learning, Reinforcement Learning, Jupyter / Colab Environment |
| 2 | Python Recap:Data Types,IO,if-elif,while-for, functions |
| 3 | Python Recap: Pandas, Numpy, Matplotlib,Seaborn Libraries |
| 4 | Linear Algebra and Probability Recap: Vector, Matrix, Tensor, Python Calculations,Probability Distribution Functions |
| 5 | Linear regression: Data Preparation, Simple Regression,Multiple regression; Error Metrics: R- squared, MAE, MSE |
| 6 | Logistic Regression: Sigmoid Function, F1 score, Confusion Matrix, ROC |
| 7 | Decision Trees: Basics,Terminology, Gini index, Entropy |
| 8 | Regularization: Overfitting, underfitting, Lasso, Ridge; Ensemble Learning: XgBoost |
| 9 | Unsupervised Learning: Clustering, K-means, Sihoutte Score |
| 10 | Artificial Neural Networks (ANN) |
| 11 | Convolutional Neural Networks (CNN) |
| 12 | Aeronautics Applications |
| 13 | Industry / Academy Seminar |
| 14 | Project Presentations |
| 15,16 | Final Examination |

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| **CONTRIBUTION OF THE COURSE LEARNING OUTCOMES TO THE AVIATION SCIENCE AND TECHNOLOGY PhD PROGRAM LEARNING OUTCOMES** | **CONTRIBUTION LEVEL** |
| **NO** | **LEARNING OUTCOMES (PhD)** | **3**High | **2**Mid | **1**Low |
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**Prepared by :**  **Date:**07.11.2022

**Signature**: