



Introduction to Mathematical Engineering MTM1521

Assoc. Prof. Fatma AYDIN AKGUN





Introduction to Mathematical Engineering Week 1

Introduction: Engineer & Engineering

Assoc. Prof. Fatma AYDIN AKGUN

fakgun@yildiz.edu.tr

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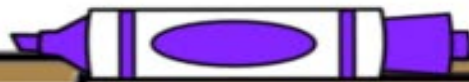




Syllabus (Subject to Change)

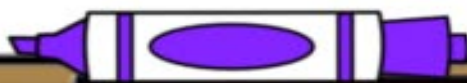
1. Introduction OF MATHEMATICAL Engineering
2. Engineer and Engineering
3. Technology
4. Invited Seminar ()
5. Invited Seminar (Project Manager)
6. Invited Seminar (Software Engineer)
7. Invited Seminar (tester)
8. Invited Seminar (Insurance and Finance)
9. Midterm I
10. Ethics
11. Invited Seminar (Basics of Business Law)
12. Midterm II
13. Invited Seminar (Entrepreneurship)
14. Invited Seminar (CRM)*Make-up Exams

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Introduction of Our Department





MATHEMATICAL ENGINEERING DEPARTMENT





Mathematical Engineering: Definition

Mathematical Engineering is an interdisciplinary engineering that aims to collaborate with other engineers in terms of mathematical modeling, analyzing and solving problems as well as realizing similar tasks alone.

Mathematical Engineers are regarded as versatile engineers

- who are able to involve in projects with other engineers
- who are skilled in problem modeling, proposing solutions, and analytical thinking

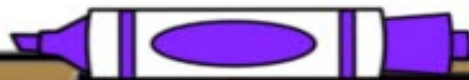




Mathematical Engineer: Definition

Mathematical Engineers:

- are equipped with basic engineering and applied mathematics knowledge.
- are capable of modeling problems encountered in engineering, economical and social fields.
- are capable of proposing solutions for the problems s/he modeled.
- are capable of developing computer softwares and using computer for solving problems
- are followers of the advancements in both science and technology as a life-long learner





Mathematical Engineering: History

- It was first established in 1956 Delft Technische Hogeschool (the Netherlands) as a separate engineering discipline “Wiskundig Ingenieurs opleiding”.
- Although the roots of Mathematical Engineering went back to Simon Stevin (Engineer and Mathematician, 1548-1620) , Mathematical Engineering was introduced by Reinier Timman (1917-1975) .
- Timman has played an important role in gathering the research done in both math and technology together as Mathematical Engineering





Mathematical Engineering: History

- ❑ In 1953, Reinier Timman announced his definition of mathematical engineering. The department started in 1956.
- ❑ After 1942, German Technische Hochschulen allowed its graduates (from Math. Diplommathematiker) to obtain engineering degree.
- ❑ In 1948, Mathematical Engineering became in dissuccession to do research in airspace industry in Japan.
- ❑ In 1954, John Tukey has suggested to start a Mathematical Engineering department in USA as a highly specialized version of Mechanical Engineering



Mathematical Engineering: History

- R. Timman has divided mathematical engineering into three different levels:
 1. Applied Mathematics;
To understand natural phenomena better
 2. Numerical Analysis;
To turn models into suitable algorithms to solve real life problems
 3. Programming and Computer

- In 1961, Mathematical Engineering department was established at Technische Hogeschool te Eindhoven.
They have added two new research directions:
operational research and management science

G. Alberts, "Mathematics as an Technology: Mathematical Engineering", Report AM-R9202 January, 1992.
<http://oai.cwi.nl/oai/asset/5529/5529D.pdf>

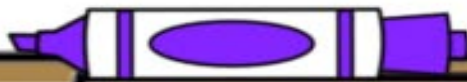
<https://pure.tue.nl/ws/files/2211656/veltkamp1961.pdf>





Mathematical Engineering in Turkey

- I.T.U. The department accepted his first students in 1973.
- Y.T.U. First students were accepted in 1976
- K.T.U. 1974- discontinued
- Işık Uni.
- Gumushane Uni. 2012-
- Mathematical Engineering has served as a base for several Math-Computer Science Departments





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Mathematical Engineering: Program Outcomes



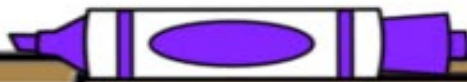
- Model Structuring by using Mathematics and Basic Engineering.
- Plays effective role in team works with other discipline(s).
- Gains to solve Mathematical Models by the using analytical, numerical and statistical techniques.
- Interprets solutions and results correctly
- Applies Algorithm Analysis and Structuring to Solve existing Problems by the use of Computer.



Mathematical Engineering: Program Outcomes



- Gains the ability and knowledge of English Language to read / understand / write and present publications.
- Makes research with industry and scientific institutions.
- Makes educational facilities.
- Have occupational responsibilities.
- Tracks current developments on the occupational areas.
- Uses the necessary technological methods and tools.
- Knows the importance of life time learning.



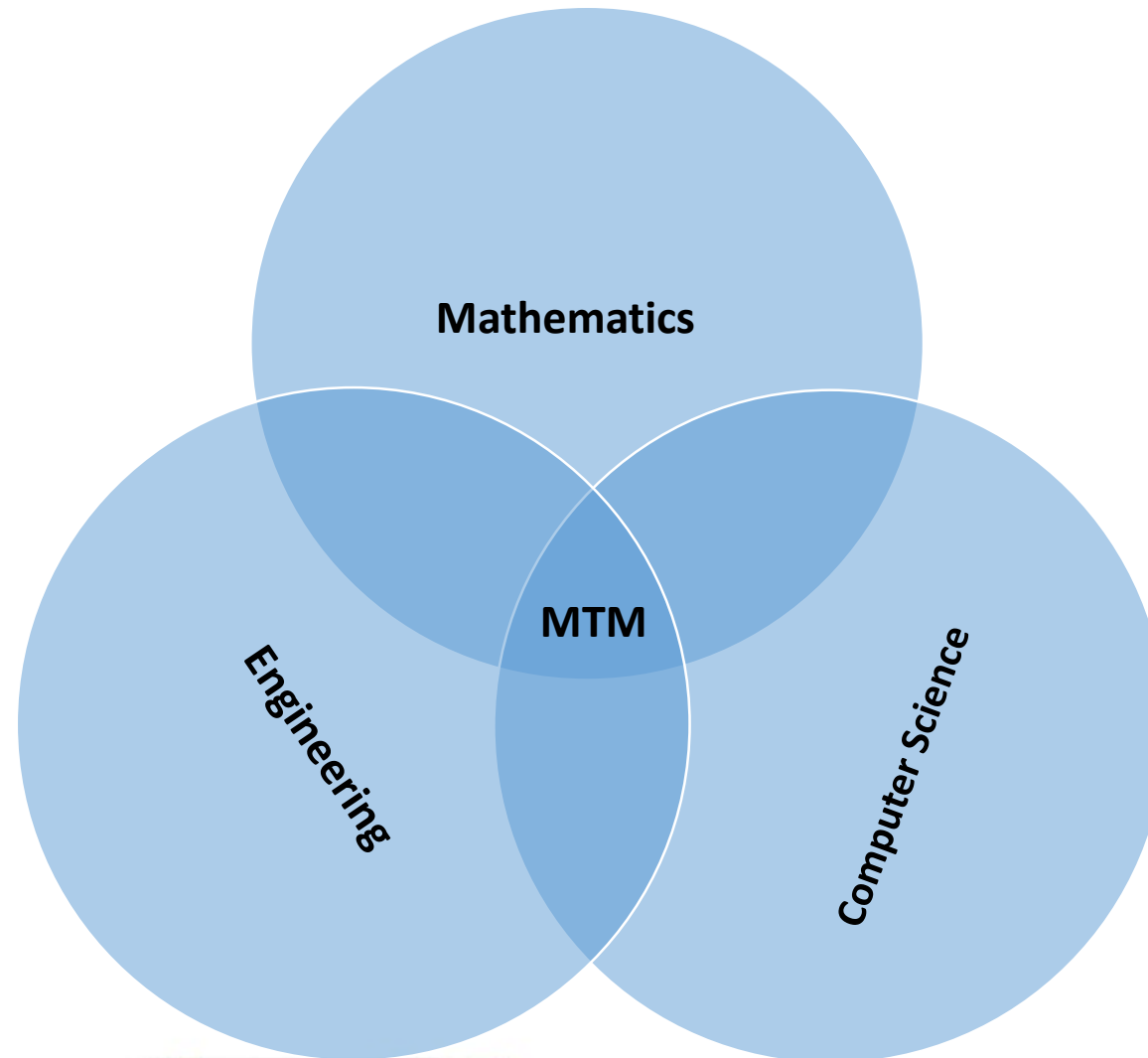
Divisions

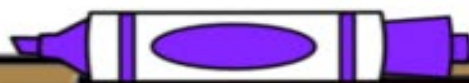
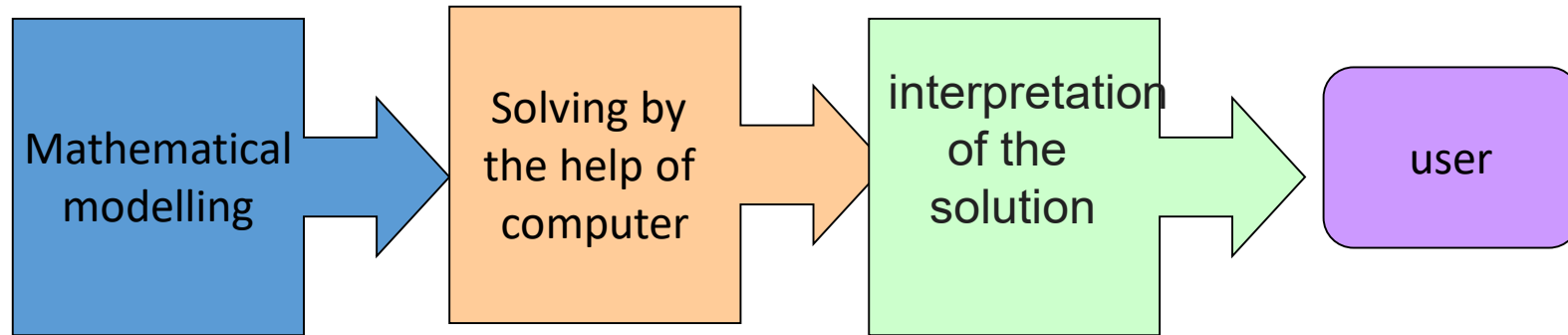


- Fundamentals of Mathematics and Mathematical Logic
- System Analysis
- Topology
- Applied Mathematics
- Applied Mechanics



Three Basic Formations:





Curriculum Overview

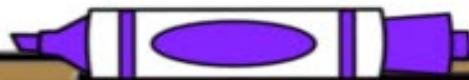
- Total 240 ECTS (European Credit Transfer and Accumulation System)
- Core Courses
27 Compulsory, 12 Elective, 2 Internships and 2 Projects (Design Applications in Mathematical Engineering and Graduation Thesis)

Total: 219 ECTS (127, 72, 4 and 16 ECTS)

- General Cultural Courses

8 Compulsory ve 1 Elective

Total: 21 ECTS (18 and 3 ECTS)





Internships:

1. Computer Hardware and Basic Applications Internship(After the 4th Semester),
2. Problem Solving Techniques Internship(After 6th Semester)

Each of them is 20 working days

They are both compulsory.

Order matters.





MATEMATİK MÜHENDİSLİĞİ BÖLÜMÜ STAJ İŞLEMLERİ VE AŞAMALARI

- 1 Staj yapılacak firma bulunur, ilgili staj komisyonundan firmanın ve tarih aralığının uygun olup olmadığına dair sözlü onay alınır.

1.1- Bilgisayar Donanımı ve Temel Uygulamaları Staj Komisyonu

Doç.Dr. Ülkü YEŞİL BABUŞÇU
Arş.Gör.Dr. Mert BAL
Arş.Gör. Fatih AYLIKÇI
Arş.Gör. Yasemin BAKIR
Arş.Gör. Minsat YEŞİLTEPE

1.2- Sorun Çözüm Teknikleri Staj Komisyonu

Yrd.Doç.Dr. Hale GONCE KÖÇKEN
Arş.Gör. Tuğçem PARTAL
Arş.Gör. Neslihan ÖZDEMİR

Erasmus Staj Komisyonu

Yrd.Doç.Dr. Armağan ELİBOL
Arş.Gör. Fatih AYLIKÇI
Arş.Gör. Seda GÖKTEPE KÖRPEOĞLU

Öğrenci belgesi üzerinde öğrencinin staj yapma zorunluluğu olduğu yazmaktadır.

Ayrıca Üniversite tarafından SGK primlerinin karşılanacağına dair yazı isteyen firmalar için öğrenci belgesi talebinde bulunurken açıklama kısmına staj için olacağına belirtilmesi gerekmektedir.

Bunların dışında herhangi bir evrak verilmemektedir.

- 2 Bölüm sitesinden gerekli formlar çıkartılır, staj defteri satın alınır, öğrenci kendi ile ilgili kısımları doldurarak fotoğrafını yapıştırır.

Takvimde staj yapılacak günler işaretlenir.

Staj İçin Gerekli Belgeler

SGK Zorunlu Staj Formu
Genel Sağlık Sigortası Beyan Ve Taahhüt Formu
Staj Sicil Formu
Takvim
Kimlik Fotokopisi
Staj Defteri

- 3 SGK Zorunlu Staj Formu firmaya onaylatılır. Bu form daha sonra staj komisyonundan bir üye tarafından imzalanır.

İŞYERİN VEYA YETKİLİNİN			
Adı Soyadı	Zeynep Arslanoglu		
Görev ve Ünvanı	Mühür		
E-posta adresi	zeynep.arslanoglu@kilidiz.edu.tr		
Tarih	15.05.2024		
Firma İsmi	Mesut ÖZER		
İmza	[İmza]		
ÖNCEKİ STAJ BİLGİLERİ (Varsa)	TARİHİ	GÜN SAYISI	STAJ YERİ
1. TEPA KONSALİMİNDE	Haftaya 40 saat	20	Mesut ÖZER
2.			
3.			
ÖĞRENCİNİN İMZASI	BÖLÜM STAJ ONAYI	SGK İŞE GİRİŞ ONAYI	
[İmza]	[İmza]	[İmza]	

- 4 Staj sicil formu ve zorunlu staj formu staj komisyonundan bir üyeye imzalatılır. Bölüm sekreterliğinde kaşe basılır.

- 5 Yapıştırılan fotoğraflar Fakülte Sekreterine mühürlenilir.

SGK Zorunlu Staj Formu
Staj Sicil Formu
Staj Defteri

- 6 Stajın başlangıç tarihinden en erken 1 ay en geç 10 gün önce SGK sigorta işlemleri için Dekanlık katında A310 no.lu Ofise teslim edilir.

Staja başlamadan birkaç gün önce onaylı formlar ve SGK İşe Giriş Bildirgesi buradan teslim alınır.

Staj defteri, formlar ve CD'nin staj bitiminden sonra en geç 1 ay içinde bölüm sekreterliğine eksiksiz bir şekilde teslim edilmesi gerekmektedir.

Staj bitim tarihinden sonraki 1 ay içinde teslim edilmeyen belgeler kabul edilmez.





Internship

In accordance with Yıldız Technical University (YTU) Undergraduate Education-Examination and Examination Regulations, It is a practical exercise in education. It is the practice or practical application of the theoretical knowledge and practical knowledge of the students. Internships must provide at least the following, or at least some, of the following objectives.

- 1- To provide a better understanding of the profession by bringing the students of Mathematical Engineering directly to the various applications of engineering,
- 2- To ensure that the theoretical knowledge of the learners in practice is related,
- 3- Directing the sources and causes of the differences between theory and practice to research,

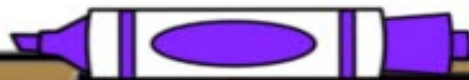




4- To be able to define a problem related to engineering applications and determine the factors affecting the problem, the variables and constraints in the problem in detail,

5- To gather information on Mathematical Engineering in practice, to make evaluations that will arise when examining these information and practical working reports,

6- Take steps to improve the relationship between the application areas,





Total training period is 40(20+20) working days. A week is considered as 5 business days. Saturdays are considered to be the full working day in workplaces that are working as full working days (provided that they are documented). The days when the student does not have a course before 18:00 are also considered as the full working day for the internship (the student has to give the certificate to the internship committee that there is no class before 18:00).

Internships are held at academic holidays. However, students who have completed the 6th semester or who have achieved all the courses in the program can do the internship with teaching at least two free working days per week (including the course before 6 pm). 2.3)

The above rules are also valid for 2nd education and summer education





Computer Hardware and Basic Practices Practice:

This is an internship aimed at examining a specific computer infrastructure belonging to an official or private organization and developing software related to this workplace. The duration is 20 working days or 4 weeks. II. It is done after half a year.





Practical Work on Problem Solving Techniques:

Engineering provides identification and analysis of problems related to solving economic problems (computer assisted if necessary). The site is 20 working days and 4 weeks. It is done after the semester





Career Fields

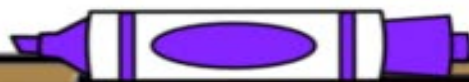
- **Information Technology**
 - Software Development/ Programming
 - System & Business Analyst
 - Consultant
 - Data Warehouse/ Big Data Specialist
- **Banking and Financial Services**
 - Banking
 - Stock Exchange
 - Insurance
 - Financial Analysis
- **Educational**
- **Research and Development**





Curriculum

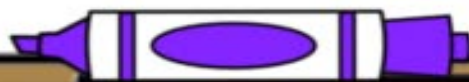
1.Year - Fall Semester							
Code	Req.	Title	Lecture	Practical	Lab.	Local Credit	ECTS
FIZ1001		Physics 1	3	0	2	4	5
MDB1031		Advanced English I	3	0	0	3	3
MTM1501		Calculus 1	5	0	0	5	6
MTM1511		Programming Language I	2	2	0	3	5
MTM1521		Introduction to Mathematical Engineering	2	0	0	2	4
MTM1531		Linear Algebra	4	0	0	4	5
MTM1541		Discrete Mathematics	2	0	0	2	2





Curriculum

1.Year - Spring Semester							
Code	Req.	Title	Lecture	Practical	Lab.	Local Credit	ECTS
FIZ1002		Physics 2	3	0	2	4	5
MDB1032		Advanced English II	3	0	0	3	3
MTM1502		Calculus 2	5	0	0	5	6
MTM1512		Programming Languages II	2	2	0	3	5
MTM1522		Abstract Mathematics	3	0	0	3	4
MTM1532		Introduction to Financial Mathematics	3	0	0	3	4
MTM1542		Mathematical Logic	2	0	0	2	3





Curriculum

2.Year - Fall Semester							
Code	Req.	Title	Lecture	Practical	Lab.	Local Credit	ECTS
TDB1031		Turkish Language 1	2	0	0	0	2
MTM2501		Advanced Calculus 1	5	0	0	5	6
MTM2511		Algorithm Analysis And Data Structures	3	0	0	3	6
MTM2521		Numerical Analysis 1	3	0	0	3	5
MTM2531		Differential Equations	5	0	0	5	6
MDB2051		Reading and Speaking in English	2	0	0	2	2
SEC0001		Social Elective	3	0	0	3	3





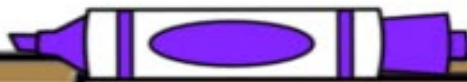
Curriculum

Elective 1 Courses							
Code	Req.	Title	Lecture	Practical	Lab.	Local Credit	ECTS
MTM2552		Integral Equations	3	0	0	3	6
MTM2562		Difference Equations	3	0	0	3	6
MTM2572		Tensor Analysis	3	0	0	3	6
MTM2582		Introduction to Finite Element Method	3	0	0	3	6
SEC0001		Elective 1	3	0	0	3	6





Yildiz Technical University (YTU) is a part of the Erasmus+ program, a European Union program since 2004, aimed at providing more effective tools to encourage cooperation between different sectors in line with the European 2020 Strategy targets for new needs in education, youth and sports. In this respect, Erasmus+ program aims to strengthen the quality of higher education and to cooperate with higher education institutions in cooperation with each other and with the business world, by contributing to the exchange of participants in the field of higher education, to the academic recognition and transparency of the studies in the countries participating in the program.





Although in the first years of the program, YIU has sent and hosted the students in a highly representative number; YIU became a university preferred by European students in the following years as well as one of the universities that sent the most students to Europe with its vision of internationalization and practices.

Our university, which increases the success graph every year, in the 2011-2012 academic year sending the most students within the scope of Turkey-wide Student Mobility has been among the first and in the following years, it ranked among the top three in the same category.

With more than 35 countries and 239 universities and nearly 600 agreements, our university continues to increase this success every year.





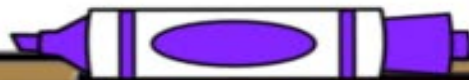
Erasmus+ aims to modernise and improve higher education across Europe and the rest of the world. It gives

students and staff opportunities to develop their skills and boost their employment prospects. Good practices will

be shared between universities and businesses in Knowledge Alliances.

Higher education institutions from participating countries can work with those from neighbourhood countries, non-

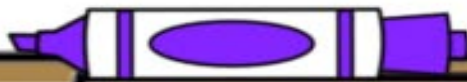
EU Balkan countries, Asia, Africa and Latin America to develop their educational systems.





**Opportunities for students to learn abroad,
including:**

- Studies, including at Master's level;
- Traineeships in businesses.
- Erasmus+ Master loans





Opportunities are available to the following organizations in participating countries:

- Students at higher education institutions;
- Higher education institution staff (academic and non-academic);
- Private companies.

Higher Education Institutions in neighbouring countries, non-EU Balkan countries, Asia, Africa, and Latin America

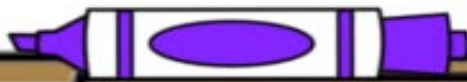
can participate in projects that take place outside the EU.





Programme Countries

- Austria, Denmark, Finland, France, Ireland, Italy, Liechtenstein, Norway,
1. Group Sweden, United Kingdom
 2. Group Belgium, Croatia, Czech Republic, Cyprus (Güney Kıbrıs), Germany, Greece, Iceland, Luxemburg, The Netherlands, Portugal, Slovenia, Spain
 3. Group Bulgaria, Estonia, Hungary, Latvia, Lithuania, Malta, Poland, Romania, Slovakia, Macedonia





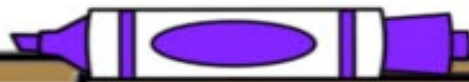
2019- 2020 Academic Calendar

Fall Semester

Courses: 16 September 2019 -20 December2019

Exams : 23 December 2019- 03 January 2020

* The Orientation Day is announced by e-mail before the beginning of the semesters.





Application Procedure:

The traineeship mobility is to be carried out between 1st June N year and 30th September N+1 year, any duration on condition that not to be fewer than two months and advised not to be longer than 90 days.

1- Please contact directly the relevant department at which you wish to work or Erasmus+ Program Unit so as to see if there is an open position for a trainee.

Please check ;

For the academic units <http://www.bologna.yildiz.edu.tr/index.php?r=academicunit/index>

For the departmental Erasmus coordinators <http://www.eu.yildiz.edu.tr/en/sayfa/8/Departmental-Coordiators/177>

For Erasmus+ Program Unit: <http://www.eu.yildiz.edu.tr/sayfa/6/%C4%B0leti%C5%9Fim-CONTACT/34>

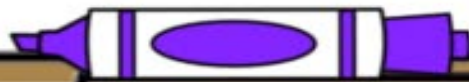




2- Accordingly, find a mentor and discuss what the traineeship might involve.

3- After you are accepted by a mentor, please fill out **Application Form** and **Learning agreement for traineeship**, have them signed&stamped by your home university and send it to erasmus-staj@yildiz.edu.tr with a passport photo in .jpeg format.

4- You will be sent a “**Letter of Acceptance**” When the Application Form has been received, **Letter of Acceptance** will be prepared by the Mentor and sent to Erasmus+ Program Unit who will stamp and send it to the trainee.

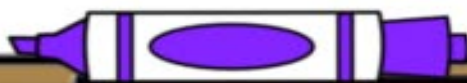




Necessary documents :

Note that all of documents need to be the latest version which can be downloaded from <http://www.eu.yildiz.edu.tr/page/10/Forms/252> and filled out electronically (no handwriting).

- Application Form (filled electronically, signed and stamped by the applicant and the home university, scanned in pdf format)
- Learning Agreement for Traineeship (filled electronically, signed and stamped by the applicant and the home university, scanned in pdf format)
- Photo (headshot in jpg format)





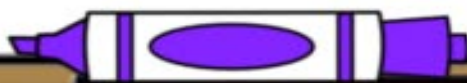
Erasmus+ Program Unit: It is the central Erasmus Office and located in Davutpaşa campus. You can contact Erasmus+ Program Unit for any administrative issues: application, acceptance, confirmation at institutional basis, etc. Contact e-mail: erasmus-staj@yildiz.edu.tr

Mentor: S/he can be one of the teaching staff who accepts you as a trainee, at your registered department. You can contact her/him for any academic issues: traineeship programs, learning agreement changes, traineeship certificate.

For academic staff of the departments, <http://www.yildiz.edu.tr/en/page/units>

For administrative staff,

<http://www.yildiz.edu.tr/en/page/administrative>





Departmental Coordinator: S/he is one of the teaching staff at your registered department. You can contact her/him for the official confirmations like signatures, if required.

Erasmus Coordinators of Mathematical Engineering Department

Coordinator of Department

Assoc. Prof. Fatma AYDIN AKGÜN
Assoc. Prof. Ulkü YEŞİL

Comissioner of Department
Dr. Fatih AYLIKÇI
Arş.Gör. Handenur Esen





Ways to get information about careers:

- Visit job fairs
- Attend seminars on campus by various employers
- Contact faculty with knowledge of engineering fields
- Get an intern or co-op position
- Enroll in an engineering elective course





END OF 1ST WEEK

