



**ANKARA YILDIRIM BEYAZIT ÜNİVERSİTESİ**  
**MÜHENDİSLİK VE DOĞA BİLİMLERİ FAKÜLTESİ**  
**MATEMATİK BÖLÜMÜ**

<b>Ders adı:</b> Sembolik hesaplamalar <b>Course name:</b> Symbolic computations						<b>Program:</b> Mathematics Department			
Dönem	Sınıfı	Ders Kodu	Teori	Uyg.	Lab.	Toplam	AKTS	Dili	Dersin Türü (Z/S)
2	2	MATH 218	3	0	0	3	5	English	C
<b>Prerequisites</b>			Calculus II and basic programming knowledge (Python recommended)						
<b>Course instructor</b>			Dr. Fatma PARLAK				e-mail: fparlak@aybu.edu.tr		
<b>Course format</b>			In person						
<b>Course objectives</b>			This course introduces symbolic computation using Python, covering fundamental concepts, practical applications, and implementation techniques.						
<b>Learning outcomes and competences</b>			After completing this course, students should demonstrate competency in the following skills: 1. To understand the dynamics, and the structure of programming with Python 2. To do or to solve problems in mathematics with Python						
<b>Textbook and/ or references</b>			1. Verschelde, J. (2023). <i>Introduction to symbolic computation</i> (Release 1.7.6). 2. A Practical Introduction to Programming and Problem Solving 4th Edition, Stormy Attaway Ph.D. Boston University (Author), Butterworth- Heinemann, 2016. 3. Mitsotakis, D. (2023). <i>Computational mathematics: An introduction to numerical analysis and scientific computing with Python</i> , CRC Press						

Değerlendirme		Sayısı	(%) Katkı oranı
	Vize	1	30
	Ödev	1	10
	Sunum	0	0
	Final Sınavı	1	60

### Course contents

Week	Subjects
1	Introduction to symbolic computation and getting started with Python
2	Exact and floating-point numbers Integer, rational, and floating-point arithmetic
3	Complex and algebraic numbers Algebraic number computations
4	Working with symbols and variables Evaluating expressions and sharing variables
5	Data representation and storage Number types and coercion
6	Evaluation and execution Arithmetic operations and expression trees
7	Data input and output Saving and loading data
8	Performance optimization Speeding up computations with vectorization
9	<b>Midterm Exam</b>
10	Working with polynomials Univariate and multivariate polynomials
11	Rational functions and conversions Representation of rational expressions
12	Expression Representations Understanding expression trees
13	Substitution, expansion, and factorization Techniques for substituting variables
14	Review for Final exam preparation

AKTS / İŞ YÜKÜ TABLOSU			
Etkinlik	SAYISI	Süresi [Saat]	Toplam İş Yüğü [Saat]
Teorik Dersler	14	3	42
Uygulamalı Dersler	0	0	0
Sınıf Dışı Ders Çalışma Süresi (Ön çalışma, pekiştirme)	14	2	28
Ödevler	1	10	10
Projeler	0	0	0
Arazi Çalışmaları	0	0	0
Arasınavlار	1	2	2
Diğer	0	0	0
Yarıyıl Sonu Sınavları	1	2	2
Toplam İş Yüğü	31	19	84
Toplam İş Yüğü / 30 saat			28