CEng 445 Software Development with Scripting Languages
Fall 2025
Syllabus

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Lectures:
Tuesday 8:40-10:30, Wednesday 12:40-13:30 BMB4

Home page:
http://odtuclass.metu.edu.tr/

Newsgroup:
http://cow.ceng.metu.edu.tr/c/courses-undergrad/ceng445

Description and Objectives
Using scripting programming languages to rapidly develop applications ranging from simple system administration utilities to large scale multi-user web applications. Contemporary scripting languages provide interface to systems programming, multimedia, graphical user interfaces, networking and web applications. They are dynamic, portable, easy to develop and can be integrated to any other utilities like web browsers, web servers, games, drawing utilities, and engineering applications. At the end of this course, students will be able to:

- Understand features, advantages and disadvantages of script languages.
- Use script languages to solve variety of computational problems.
- Develop concurrent applications and networking applications using script languages.
- Use object oriented design principles to model and develop software.
- Understand how WWW applications work.
- Develop WWW based applications.

References

- Allen Downey, Python for Software Design: How to Think Like a Computer Scientist, 2009, ISBN: 978-0521725965
- Python notebooks and slides at https://github.com/onursehitoglu/python-445

Outline

Week	Topic	Description
30 Sep – 1 Oct	Introduction	Introduction to scripting languages, features and design
6–7 Oct	Syntax	Syntax of scripting languages. Types, values, expressions, loops, functions
13–14 Oct	Iterators, Decorators and Testing	Iterators, generators, testing, profiling and some usefull libraries. Binary binding of script languages
20–21 Oct	Object Oriented	OO features of scripting programming languages. Basic design and data structures patterns. Refactoring
27–28 Oct	Systems programming	OS interface of scripting languages. Files, IO facilities, system status. Inter-process communication
4–5 Nov	Concurrenct Programming	Concurrency models and multi-thread programming
11–12 Nov	Concurrenct Programming and Networking	Multi processing. Socket programming. Server and client applications using scripting languages.
18–19 Nov	Web programming	Web standards. CGI, cookies and authentication. MVC.
25–26 Nov	Web programming	Web application frameworks. Templates and ORMs. Midterm, 26^{th} Nov, tentative.
2–4 Dec	Web services	RESTful APIs, service oriented architectures. OpenAPI
9–10 Dec	Browser side scripting.	Document Object Model and Javascript basics.
16–17 Dec	Browser side scripting	AJAX interface between browser and server sides, JQuery
23–24 Dec	Javascript frameworks	

Project:

Project topic will be selected based on a theme and developed in phases. It will start as a class library, then a TCP based service, then a web service, then an enriched web application with all functionality and user experience. Each phase will be a deliverable like a homework and graded separately. Projects will be done in groups of 2. Both members have to know all detail of the project. Groups will be asked to demonstrate the project phases whenever appropriate. Cheating policy is "cheat once, all zeros" meaning the whole project grades of the both parties will be zero in case of a single cheating incident.

Project submission deadlines will not be postponed. Late submission penalty will be $5 + 2d^2$. Only 5 days of late submission is allowed. Pop quizes will be short quizes on odtuclass where only attending students can join.

Grading:

Midterm	30%
Term project	35%
Final	30%
Pop quizes	5%