**Course name:** CENG 503 – Computer Aided 3D Facial Reconstruction  
**Department:** Computer Engineering  
**Semester:** Fall

<table>
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<tr>
<th>Methods of Education</th>
<th>Lecture</th>
<th>Recitation/ (Etud)</th>
<th>Lab</th>
<th>Project/Field Study</th>
<th>Homework</th>
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**Language**: English  
**Compulsory/Elective**: Elective  
**Prerequisites**: None

**Course Contents**
This course reviews three dimensional (3D) computer aided facial reconstruction. It aims at teaching the students reconstructing the face from the skull using the application of 3D computer graphic techniques.

General information on 3D technologies including 3D hardwares and softwares will be introduced in the beginning. Scanning and processing of the anthropological materials using 3D scanner will be presented. 3D data visualization, analysis, modeling and remodeling of an object with the use of haptic device modeling software will also be presented.

Facial anatomy and muscles of the face will be prioritized in order to emphasize the significance of facial muscles in facial reconstruction.

Specifically the following related topics will be covered: visualizing scientific data sets from various application areas (e.g. medicine, biology, bio-chemistry, microscopy, biomed, bioengineering, facial tissue depth databases for different populations, and its use for computer aided facial reconstruction will be presented.

After introducing all these techniques, a practical study for computerized facial reconstruction will be done by the students. The students will reconstruct the face from the skull with using the 3D scanner and haptic device modeling software.

**Course Objectives**
Students should acquire knowledge and comprehension of 3D technologies including 3D softwares, 3D hardwares and applications.

Students should also learn techniques for computer aided facial reconstruction, i.e., anatomical reconstruction, facial tissue depth based reconstruction and volumetric reconstruction. Students should also acquire the ability of modeling and processing the 3D objects.

Finally, the students should be able to develop the ability to scan the object, import the object into 3D virtual platform (world) and process it for specific functional applications. A project work embedded in the course will introduce students to proper information search tools and report/presentation preparation strategies that are essential to perform...
This course will give an advanced level introduction on the applications of 3D computerised facial reconstruction.

After a successful completion of the course, students should be able to:
- Describe 3D objects and principles of 3D scanning.
- Learn how to use 3D scanner for scanning a solid material (object).
- Model an 3D object in a virtual platform using with 3D software.
- Describe facial anatomy and principles of the skull morphology.
- Describe different techniques for facial reconstruction.
- Describe and explain 3D file types and features used in facial reconstruction studies.
- Explain underlying principles of regression equations for reconstructing the facial parts.
- Explain the relationship between the hard tissue and soft tissue.
- Perform facial reconstruction cases.

Different sections of the course will require different resources. Handouts and related up-to-date literature resources will be utilized and distributed during classes. The following textbooks will be useful and will be followed for the indicated topics:


Course material will be provided electronically and extra web-based resources will be introduced during the course.

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<th>Assessment Criteria</th>
<th>If any, mark as (X)</th>
<th>Percentage (%)</th>
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<td>Projects</td>
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<td>Final Exam(Oral presentation)</td>
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Instructors
Dr. Özgür BULUT