

## **AC 2007-522: CIVIL ENGINEERING EDUCATION AT THE UNIVERSITY OF FLORIDA AND THE MIDDLE EAST TECHNICAL UNIVERSITY, REPUBLIC OF TURKEY**

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# **Civil Engineering Education at the University of Florida and the Middle East Technical University, Turkey**

## **Abstract**

Civil engineering is a discipline that amalgamates art and science to create and refine infrastructure work, provides solutions according to the needs of modern civilization, and protects the environment. The dynamics of the current global marketplace suggests that civil engineers are among the best-positioned professionals to be able to utilize the cutting edge technology. Civil engineers find numerous opportunities in industry, be it through consulting practices, research or development.

However, for civil engineering to maintain its importance in a global business setting, it is imperative that institutions' curricula be regularly revised to meet the world's perpetual evolving social and environmental needs.

Both the civil engineering programs leading to a bachelor's of science degree are four-year programs. The College of Engineering at the University of Florida has 11 academic departments, while the College of Engineering at the Middle East Technical University has 14. Civil engineering is one of the departments in the College of Engineering at both universities.

However, the required credits required between the programs are quite varied. The curriculum leading to the Bachelor of Science in Civil Engineering degree at the University of Florida consists of 131 credits, while that of the Middle East Technical University consists of a minimum of 152 credits. The University of Florida allows for 52 general education credits while the Middle East Technical University provides for 39. In terms of core engineering credits, the University of Florida requires 79 engineering-based credits, while the Middle East Technical University requires 85.

This paper compares and analyzes the current civil engineering undergraduate curriculum at the Middle East Technical University with that of the University of Florida's. The results of this study indicate that both curricula meet the educational requirements of both the United States and that of the Republic of Turkey.

## **Introduction**

The Middle East Technical University (METU) is located in Ankara, the capital city of Turkey. METU was founded in 1956 under the name of Middle East High Technology Institute to help contribute to the development of Turkey and Middle East countries by graduating skilled workforces in the fields of natural and social sciences. There are currently 47 undergraduate programs divided into five faculties, namely the Faculty of Architecture, Faculty of Engineering, Faculty of Economic and Administrative Sciences, Faculty of Arts and Sciences, and the Faculty of Education. There are 152 graduate programs in graduate schools of natural sciences, social sciences, informatics, applied mathematics and marine sciences. The official language utilized by instructors at METU is English. The civil engineering undergraduate program at METU was founded between 1957 and 1958 during the establishment of the Faculty of Engineering.

Therefore, the program is offered by the Faculty of Engineering, Department of Civil Engineering.<sup>1</sup>

The University of Florida (UF) is located in Gainesville, Florida, and was founded in 1853, making it the oldest university in the state. UF currently offers more than 52 undergraduate programs in a broad variety of instructional fields. The Department of Civil Engineering at UF was established in 1910 and later merged with the Department of Coastal and Oceanographic Engineering in 1999. The civil engineering undergraduate program at UF is considered one of the top programs in the United States of America (USA).

### **Admission requirements**

Both educational programs have certain requirements that students are expected to meet if they wish to study civil engineering.

Admission at UF is based on the student's high school Grade Point Average (GPA), Scholastic Aptitude Test 1 (SAT 1) and the American Collegiate Test (ACT). International students are required to have either been educated in an English speaking country or provide results of TOEFL test.

The minimum requirements for qualification into the program are<sup>2</sup>:

- Graduation from a regionally accredited or state-approved secondary school or the equivalent (G.E.D., etc.).
- Fifteen academic units, including 4 years of English, 3 years of math, 3 years of natural sciences (two with laboratories), 3 years of social sciences, and 2 sequential years of a foreign language.
- A cumulative C average in the academic core, as computed by the university, at all institutions attended, high school and college.
- A total score of at least 950 on the SAT (minimum 440 on either verbal or quantitative), or a composite ACT score of 19 with a minimum of 17 on the English subsection, 19 on the math, and 18 on the reading.

When students are coming from a non-accredited school or home schooling, in addition to a transcript and the new SAT or ACT with writing results required of other applicants, they must provide results from the SAT II examinations in mathematics (Level II-C), foreign language, science and social science. For admission decision purposes, the university will use the result of the new SAT writing subscore, if the applicant has no dual-enrollment or virtual school English composition coursework, since the SAT II in writing is no longer offered. Applicants who present G.E.D. scores must also present secondary school records and standardized test scores.<sup>3</sup>

In order to acquire admission to METU, students must be graduated from high school, lyceums or equivalent institutions. In addition, Turkish students should acquire a sufficient score from the University Entrance Examination.

International students should have sufficient scores from any one of the following exams:

- A minimum score of 60 (2005 based score: 65.724) from the University Entrance Examinations for International students.
- A total of 1100 out of 1600 from Math and Critical Reading sections and minimum 650 out of 800 from Math in SAT Reasoning test. Alternatively, a total score of above 1100 and Math score of above 650 from SAT I.<sup>4</sup>
- For students from Jordan and Palestine, a percentage average of 85% from scientific stream of Tawjihi.<sup>4</sup>
- For students from Lebanon, a minimum diploma grade of 70 out of 100 from scientific stream of Baccalauréat Libanais.<sup>4</sup>
- A total score of minimum 30 from International Baccalaureate.<sup>4</sup>
- At least three A levels with C average from GCE, one of which is related to the program of application.<sup>4</sup>
- A gold, silver or bronze medal from one of the International Science Olympiads that is recognized by the Scientific and Technical Research Council of the Turkish Republic (TUBITAK).<sup>4</sup>
- A score of 520 out of 750 of University Entrance Examination in China (Gaokao) from the stream related to the program of application.<sup>4</sup>
- For students from Iran, a minimum average of 17 out of 20 from Diplome Debirestan and a minimum average of 18 out of 20 from Pishdaneshgahi.<sup>4</sup>
- For students from Syria, a score of 190 out of 240 from Scientific Stream of Al-Shahada-Al-Tahanawiyya (Baccalaureate).<sup>4</sup>
- The medium of instruction at METU is English. Therefore students should acquire a sufficient score from an English Proficiency Exam otherwise students would be asked to attend English Preparatory Class in the Department of Basic English.<sup>4</sup>

### **METU undergraduate program degree**

The civil engineering program at METU is a four-year program based on two 16-week semesters including the registration and final examination period, and one five-week summer semester per year. The student must take classes based on predetermined course plans. In the second year of

the program, students must select a non-technical elective course per semester, and one non-technical elective in the first semester of the fourth year. Seven technical electives must be selected in the fourth year of the program, along with a free elective course. Four out of seven technical courses must be in the same major branch and the three remaining courses from other branches. At least two courses must be engineering design courses. One course may be taken from other engineering departments subject to the approval of the Civil Engineering department. Table 1 shows the civil engineering undergraduate curriculum at METU. The program consists of eight semesters, with an average of six courses per semester. The credit rating of the courses' course load is determined by the University Senate upon the recommendation of the Department and faculty. A student's normal course load in each semester may be reduced by up to 2 courses at most with the approval of the Chairman of the Department, if the Cumulative Grade Point Average (CGPA) is less than 2.00. Students with CGPA of at least 2.00, who have fallen behind in their program and want to catch up or want to retake courses to improve their CGPA, may increase their course load by only one course on the recommendation of their advisor and with the approval of the Chairman of the Department. Course loads of students whose CGPA is at least 2.50 can be increased by two courses at most upon the student's request by student advisors.

Most of the courses in the first two semesters are common and shared with the students from other colleges such as: basic calculus, general physics, general chemistry, etc. In the second year of the program, Turkish students must take Principles of Kemal Ataturk I & II with no credits. During the third year, international students must take Turkish I & II with no credits. Practical experience is required for the degree, therefore students are required to go into summer practice at the end of their second and third years and to have a satisfactory record of their summer employment approved by the Department.

The sixth column in Table 1 shows European Credit Transfer and Accumulation System (ECTS) that is a student-centered system based on the student workload required to achieve the objectives, preferably specified in terms of the learning outcomes and competences to be acquired.<sup>5</sup> ECTS is based on the principle that 60 credits measure the workload of a full time student during one academic year. The student workload of a full-time study program in Europe amounts to around 1500-1800 hours per year in most cases and in those cases one credit stands for around 25 to 30 working hours. Credits in ECTS can only be obtained after successful completion of the work required and appropriate assessment of the learning outcomes achieved.

Table 1. METU Civil Engineering Undergraduate Curriculum

<b>First Year</b>					
<b>First Semester</b>					
<b>Course Code</b>	<b>Course Name</b>	<b>METU Credit</b>	<b>Theory (h/w)*</b>	<b>Lab (h/w)</b>	<b>ECTS</b>
MATH 119	CALCULUS WITH ANALYTIC GEOMETRY	5	4	2	7.5
PHYS 105	GENERAL PHYSICS I	4	3	2	6.5
CHEM 107	GENERAL CHEMISTRY	4	3	2	6.0
CE 101	CIVIL ENGINEERING DRAWING	3	2	2	4.0
ENG 101	DEVELOPMENT OF READING&WRITING SKILLS I	4	4	0	6.0

IS 100	INTRO.TO INFORMATION TECH.AND APPL.	0	0	0	1.0
<b>Second Semester</b>					
Course Code	Course Name	METU Credit	Theory (h/w)*	Lab (h/w)	ECTS
MATH 120	CALCULUS FOR FUNCTIONS OF SEVERAL VARIABLES	5	4	2	7.5
PHYS 106	GENERAL PHYSICS II	4	3	2	6.5
CE 102	INTRODUCTION TO CIVIL ENGINEERING	0	2	0	2.0
GEOE 104	GEOLOGY FOR CIVIL ENGINEERING	3	3	0	5.0
CENG 230	INTRODUCTION TO C PROGRAMMING	3	2	2	4.0
ENG 102	DEV. OF READING & WRITING SKILLS II	4	4	0	6.0
<b>Second Year</b>					
<b>First Semester</b>					
Course Code	Course Name	METU Credit	Theory (h/w)*	Lab (h/w)	ECTS
MATH219	INTRODUCTION TO DIFFERENTIAL EQUATIONS	4	4	0	7.0
HIST2201	PRINCIPLES OF KEMAL ATATÜRK I	0	2	0	1.0
CE202	SURVEYING	3	1	4	6.0
CE221	ENGINEERING MECHANICS I	3	3	0	5.0
CE231	ENGINEERING ECONOMY	3	3	0	5.0
CE241	MATERIALS SCIENCE	3	2	2	4.0
	NONTECHNICAL ELECTIVE	0	0	0	5.0
<b>Second Semester</b>					
Course Code	Course Name	METU Credit	Theory (h/w)*	Lab (h/w)	ECTS
HIST2202	PRINCIPLES OF KEMAL ATATÜRK II	0	2	0	1.0
ES202	MATHEMATICS FOR ENGINEERS	3	3	0	5.0
CE222	ENGINEERING MECHANICS II	3	3	0	5.0
CE224	MECHANICS OF MATERIALS	4	3	2	5.0
CE244	MATERIALS OF CONSTRUCTION	4	3	2	6.0
ENG211	ACADEMIC ORAL PRESENTATION SKILLS	3	3	0	4.0
	NONTECHNICAL ELECTIVE	0	0	0	5.0
<b>Third Year</b>					
<b>First Semester</b>					
Course Code	Course Name	METU Credit	Theory (h/w)*	Lab (h/w)	ECTS
ES303	STATISTICAL METHODS FOR ENGINEERS	3	3	0	5.0
ES361	COMPUTING METHODS IN ENGINEERING	3	3	0	5.0
CE300	SUMMER PRACTICE I	0	0	0	4.0
CE323	INTRODUCTION TO STRUCTURAL MECHANICS	3	3	0	5.0
CE353	PRINCIPLES OF TRANSPORTATION&TRAFFIC ENG.	4	3	2	5.0
CE363	SOIL MECHANICS	4	3	2	5.0

CE371	FLUID MECHANICS	3	3	0	5.0
<b>Any one of he following set</b>					
TURK105	TURKISH I	0	2.0	0	1.0
TURK201	ELEMENTARY TURKISH	0	0	0	1.0
TURK303	TURKISH I	0	0	0	1.0
<b>Second Semester</b>					
Course Code	Course Name	METU Credit	Theory (h/w)*	Lab (h/w)	ECTS
CE332	CONSTRUCTION ENG. & MANAGEMENT	3	3	0	5.0
CE366	FOUNDATION ENGINEERING I	3	2	2	4.0
CE372	HYDROMECHANICS	4	3	2	6.0
CE376	ENGINEERING HYDROLOGY	3	3	0	5.0
CE382	REINFORCED CONC. FUNDAMENTALS	3	3	0	5.0
CE384	STRUCTURAL ANALYSIS	3	3	0	5.0
<b>Any one of he following set</b>					
TURK106	TURKISH II	0	2	0	1.0
TURK202	INTERMEDIATE TURKISH	0	0	0	1.0
TURK304	TURKISH II	0	0	0	1.0
<b>Fourth Year</b>					
<b>First Semester</b>					
Course Code	Course Name	METU Credit	Theory (h/w)*	Lab (h/w)	ECTS
CE400	SUMMER PRACTICE II	0	0	0	4.0
CE410	CIVIL ENGINEERING DESIGN	3	2	2	7.0
CE471	WATER RESOURCES ENGINEERING	3	3	0	5.0
CE485	FUNDAMENTALS OF STEEL DESIGN	3	2	2	7.0
	TECHNICAL ELECTIVE	3	3	0	5.0
	TECHNICAL ELECTIVE	3	3	0	5.0
	TECHNICAL ELECTIVE	3	3	0	5.0
ENG 311	ADVANCED COMMUNICATION SKILLS	3	3	0	4.0
<b>Second Semester</b>					
Course Code	Course Name	METU Credit	Theory (h/w)*	Lab (h/w)	ECTS
	FREE ELECTIVE	3	3	0	5.0
	TECH. ELECTIVE = DESIGN ELECTIVE	3	2	2	7.0
	TECHNICAL ELECTIVE	3	3	0	5.0
	TECHNICAL ELECTIVE	3	3	0	5.0
	TECHNICAL ELECTIVE	3	3	0	5.0

There are minor programs in geotechnics and structural analysis and design. A minor program consists of a minimum of 18 credits. To be eligible for a minor program, a student's cumulative grade point average must be at least 2.50.

### Minor program in structural analysis and design

“The purpose of this minor program is to introduce students especially in the architecture department to the modern methods of structural analysis, and to acquaint them with current design procedures. The emphasis is on buildings although other structural forms will also be

used to illustrate the underlying concepts.”<sup>6</sup> Table 2 shows the compulsory and additional courses in the structural analysis and design minor program.

Table 2. Minor Program in Structural Analysis and Design Courses

Course Code	Course Name	METU Credit	Theory (h/w)*	Lab (h/w)	Prereq.
<b>Compulsory Courses</b>					
CE 323	INTRODUCTION to STRUCTURAL MECH.	3	3	0	CE 224
CE 382	REINF. CONCRETE FUNDAMENTAL	3	3	0	CE 224
CE 384	STRUCTURAL ANALYSIS	3	3	0	CE 323
CE 485	FUNDAMENTALS of STEEL DESIGN	3	2	2	CE 323
<b>Additional Courses (any two of the additional courses)</b>					
CE 481	REINF. CONCRETE STRUCTURES	3	3	0	CE 382
CE 483	ADV. STRUCTURAL ANALYSIS	3	3	0	CE 384
CE 486	STRUC. DESIGN: CONCRETE STRUC.	3	3	0	

### Minor program in geotechnics

“This program is aimed at students in other fields of engineering and science wishing an introduction to the behavior of engineering soils and geotechnical applications, especially those who are likely to collaborate with geotechnical engineers in their future professional life. The program requires basic knowledge of engineering mechanics and hydraulics.”<sup>6</sup>

Table 3. Minor Program in Geotechnics

Course Code	Course Name	METU Credit	Theory (h/w)*	Lab (h/w)	Prereq.
<b>Compulsory Courses</b>					
CE 323	INTRO. TO STRUCTURAL MECHANICS	3	3	0	CE 224
CE 363	SOIL MECHANICS	4	3	2	
<b>Additional Courses (any four of the additional courses)</b>					
CE 366	FOUNDATION ENGINEERING	3	2	2	CE 363
CE 384	STRUCTURAL ANALYSIS	3	3	0	CE 323
CE 461	COMPUTER APPLICATION IN FOUNDATION ENGINEERING	3	2	2	
CE 462	FOUNDATION ENGINEERING II	3	2	2	
CE 464	GROUND IMPROVEMENT	3	3	0	
CE 465	EARTH STRUCTURES	3	2	2	CE 363
CE 467	INTRODUCTION TO SOIL DYNAMICS	3	3	0	

Students successfully completing their fourth year are entitled to a “Bachelor of Science in Civil Engineering” degree.

### UF undergraduate program degree

The UF undergraduate program degree is a four-year course spanned over nine semesters. In the majority of the first couple of semesters, courses are more general and shared with students from other colleges and include analytical geometry and calculus, technical writing, and physics. It is from the third semester that engineering students are taught engineering-based courses such as “Introduction to Civil Engineering” which allows students to see the numerous types of



engineering departments. The following semester teaches more technical classes, such as thermodynamics and statics. Unlike METU, Co-ops/Internships are not required for UF students, but it is recommended.

Overall, the current civil engineering curriculum at UF leading to a bachelor of science degree consists of 131 credits made up of 52 credits of general education, 11 credits of engineering fundamentals, 53 credits of required civil engineering course work, and 15 credits of engineering electives specific to a desired track (Construction Engineering track, Geotechnical Engineering track, Hydrology & Water Resources Engineering track, General Civil Engineering track, Structural Engineering track and Transportation Engineering track).<sup>7</sup> All students are required to pass the Fundamentals of Engineering (FE) Exam to complete their degree in civil engineering.

**Curriculum Comparison**

There is a slight difference between the credit hour ratings; at UF every course taught is designated a total number of credit hours. The number of credit hours for a class reflects approximately the total hours a student spends per week in class<sup>8</sup>; at both UF and METU each course is allotted a predetermined number of credit hours. At METU these include all of the weekly theoretical course hours plus half of the weekly laboratory, practical, or studio course hours.<sup>9</sup>

Laboratory classes at METU are always part of the activities of specific courses in either basic sciences or engineering sciences. At UF, the curriculum offers courses completely dedicated to lab work in the pre-engineering courses.

Table 4 presents a list of the courses offered at UF and METU. A term-by-term comparison based on content is made here. The left side of the Table 4 shows an example of the necessary undergraduate courses for obtaining 131 credits at UF (degree requirement). The right side of Table 4 shows the courses that students are required to take under the plan of study at METU. The total at the bottom of Table 4 shows the difference in the number of credits and number of courses required to complete the civil engineering degree at both universities.

Table 4. Course Comparison Between UF and METU

Course No.	Course at UF	Credits	Equivalent Course at METU	Credits
<b>Semester 1</b>				
MAC 2311	Analytical Geom. & Calculus I	4	Calculus with Analytic Geom.	5
CHM 2045	Chemistry & Lab. I	4	General Chemistry	4
GEN. ED.	Humanities	3	General Physics I	4
GEN. ED.	Social & Behavioral Science	3	Civil Engineering Drawing	3
			Development of Reading & Writing Skills I	4
			Intro. To Info. Tech. & App.	0

<b>Semester 2</b>				
MAC 2312	Analytic Geom. & Calculus II	4	Calc. for Func. of Several Variables	5
CHM 2046	Chemistry II	3	Intro. To Civil Engineering	0
PHY 2048	Physics & Lab. I	4	General Physics II	4
ENC 2210	Technical Writing	3	Geology for Civil Engineering	3
			Introduction to C Programming	3
			Development of Reading & Writing Skills II	4
<b>Semester 3</b>				
MAC 2313	Calculus III	4	Intro. To Differential Equations	4
PHY 2049	Physics & Lab. II	4	Surveying	3
GEN.ED.	Humanities	3	Engineering Mechanics I	3
GEN.ED.	Social Science	3	Engineering Economy	3
CGN 2002	Intro. to Civil Engineering	1	Materials Science	3
			Non Technical Elective	0
			Principles of Kemal Ataturk I	0
<b>Semester 4</b>				
MAP 2302	Differential Equations	3	Mathematics for Engineers	3
EGM 2511	Static	3	Engineering Mechanics II	3
EML 3100	Thermodynamics		Mechanics of Materials	4
Or			Materials of Construction	4
EML 3007	Thermo and Heat Transfer	3	Academic Oral Presentation Skills	3
STA 3032	Engineering Statistics	3	Non Technical Elective	0
GEN.ED.	Humanities or Social Science	3	Principles of Kemal Ataturk II	0
<b>Semester 5</b>				
EGM 3400	Elements of Dynamics	2	Statistical Methods for Engineers	3
EGM 3520	Strength of Material	3	Computing Methods in Engineering	3
CGN 3421	Computer Program for CE	4	Introduction to Structural	
CGN 3710	Experimentation	3	Mechanics	3
CGN 4101	Civil Engineering Cost Analysis	3	Principles of Transportation & Traffic Engineering	4
			Soil Mechanics	4
			Fluid Mechanics	3
			Turkish I	0
			Summer Practice I	0
<b>Semester 6</b>				
CGN 3501	Civil Engineering Materials	4	Construction Eng. & Management	3
CEG 4011	Soil Mechanics	4	Foundation Engineering I	3
SUR 2322	Project Dev. And Visualization	3	Hydromechanics	4
CWR 3201	Hydrodynamics	4	Engineering Hydrology	3
			Reinforced Concrete Fundamentals	3
			Structural Analysis	3
			Turkish II	0
<b>Semester 7</b>				
CES 3102	Intro. To Structural Analysis	4	Civil Engineering Design	3
CEG 4012	Geotechnical Engineering	3	Water Resources Engineering	3
CCE 4204	Construction Methods and Management	4	Fundamentals of Steel Design	3
CWR 4202	Hydraulics	3	Advanced Communication Skills	3
			Technical Elective	3
			Technical Elective	3
			Technical Elective	3
			Summer Practice II	0

<b>Semester 8</b>				
CES 4702	Reinforced Concrete	4	Free Elective	3
TTE 4004	Transportation Engineering	3	Technical Elective	3
SUR 4201	Route Geometrics	3	Technical Elective	3
ENV 4514	Water and Wastewater Treatment	3	Technical Elective = Design	3
EGN 4034	Ethics	1	Elective	3
<b>Semester 9</b>				
CGN 4600	Public Works Engineering	3		
	General CE Elective	3		
CGN 4910 Or CGN 4905	Structure-Geotech- Construction Design Transportation-Water- Materials Design	3		
	<b>Two courses from the following list:</b>			
CEG 4111 Or CES 4034 Or CES 4605 Or TTE 4811 Or CWR 4306	Foundation Engineering Design Construction Estimating Analysis and Design in Steel Physical Design Transportation Elements Urban Stormwater Design	6		
<b>Total Credits</b>		<b>131</b>		<b>147</b>

Engineering courses that include lab classes at UF have a total of 4 credits; three for the lecture and one for the laboratory course for which the student registers separately. At METU, engineering courses that include lab classes consist of 2 or 3 hours for lectures and 2 hours of laboratories. Laboratory hours are counted as half of the weekly laboratory work. At METU, a student who fails the lab is considered to have failed the entire course. At METU, some courses are taken only by Turkish citizens (i.e., Principles of Kemal Ataturk I). In order to balance the course load, the international students must take non-elective courses.

The total credits earned by METU students are higher than the UF students. This difference can be explained by the additional language courses, “Development of Reading and Writing Skills” I & II, and “Academic Oral Examination Skills,” required since at METU the medium of instruction is English and students must become familiar with advanced aspects of the English language. Another difference is caused by industrial metaphysics, for example students at METU are obligated to learn civil engineering drawing by hand and computer programs (i.e., AutoCAD). Other than the items mentioned above, the core conceptual issues are similar in both universities.

Professional training during the student’s academic career is optional at UF through internship, but opportunities for interning in a local civil engineering firm are limited due to the city’s size. Students wishing to do an internship often look at major cities nearby such as Orlando, Tampa,

or Jacksonville and must make the commute to class or take a semester off. At METU, students are obligated to go through two summer practices (internships) as a graduation requirement.

The Civil Engineering program at both UF and METU are each accredited by the Engineering Accreditation Commission of Accreditation Board for Engineering and Technology (ABET). ABET is the recognized accreditor for college and university programs in applied science, computing, engineering and technology and is among the most respected accreditation organizations in the United States.

The METU Civil Engineering program has partnerships with universities in over 40 different countries including Italy, Germany, U.K., France, and Spain. In the USA, the partnerships include the University of California at Berkeley, University of Illinois, (Urbana Champaign), University of Michigan (Ann Arbor), and the University of Texas at Austin.

The UF Civil Engineering program also has a global exchange and cooperative programs with universities in countries such as France, Korea, Australia, Mexico, Puerto Rico, Spain, China, Ecuador, Brazil, Qatar, Russia, Sweden, and Vietnam.<sup>10</sup>

Student learning outcomes cannot be compared due to the lack of data. However, the number of graduates per year in the Civil and Coastal Engineering Department at UF is on the rise. In 2000, 89 students graduated. In 2005, the number increased to 120 students. In addition, the student graduation cumulative grade point average (GPA) was 3.06 in 2000, which increased to 3.20 in the year 2005.

## **Conclusions**

In this paper, the curriculum of the civil engineering undergraduate courses at the University of Florida and the Middle Eastern Technical University are compared. An analysis and evaluation of both curriculums was performed to determine the similarities and differences. The major aspect taken into account in the comparison was the duration of the programs, special courses or activities of each curriculum, the differences in the student academic load, and curriculum flexibility.

At both universities, the civil engineering degree is obtained in four years; at UF in nine semesters, while at METU in eight semesters. This difference causes a higher work load at METU per semester. Concerning the total credit amounts, there is not much difference between these universities. The courses taken in both universities are fairly similar to the each other.

Both courses are similar in their goals to gradually introduce the basic engineering skills to the students. Subjects such as math and science are initially taught by the departments, before providing the students with more advanced subject matter such as structural steel design and hydraulics. In addition, both courses allow students to choose course electives towards the end of their degrees to help students concentrate on subject matter they believe they would like to specialize in, in the future.

METU utilizes a required internship during the latter semester of the course to allow students to appreciate the theoretical knowledge they have been taught and attempt to utilize it in the workplace. UF does not require this, but does recommend it as one of the electives to be taken by students prior to degree completion.

While there are numerous differences in terms of class titles, credits accounted to specific subject matter, and even the timing of when subjects are introduced to the students during their degree programs, it can be stated that the fundamental goal of providing the students with a scope of civil engineering knowledge, experience, and tools to utilize in the workplace is the same.

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