



Dept. of Civil, Architectural, and Environmental Engineering
 1251 Memorial Drive
 McArthur Engineering Bldg., Rm 325
 Coral Gables, FL 33146

Last Updated: **December 11, 2020**

PLANNED COURSE ROTATION FOR CAE COURSES

The actual course offerings can be viewed online using CaneLink. For planning purposes, the course rotations are shown on the following pages. These include:

- Civil Engineering courses: Structures / Geotechnical / Transportation
- Architectural Engineering courses: MEP & Construction
- Civil Engineering courses: Water & Environmental
- Biomedical Engineering (BME), Industrial Engineering (IEN), and Mechanical & Aerospace (MAE) graduate courses relevant to CAE

Example rotation:

3 Sections of CAE 210 should be offered.

1 Combined section of CAE 520 and CAE 620 should be offered.

Semester	Undergraduate											Graduate				
Spring 2018	210	211	212		313	310	321	450	370	371	402	404	520/620	590/690	604	711
	210		212		313					371						
	210									371						

CIVIL ENGINEERING COURSES: STRUCTURES / GEOTECHNICAL / TRANSPORTATION

Semester	Undergraduate												Graduate					
Fall 2018	210 210 210	211	212 212 212	213 213		310	320	350	470		402	403	521/ 621	511/611			716	744
Spring 2019	210 210 210	211	212 212		313 313	310	321	450	370	371 371 371	402	404	520/ 620	523/623	570/ 670	604	714	
Fall 2019	210 210 210	211	212 212 212	213 213		310	320	350	470		402	403	521/ 621	525/625			712	744
Spring 2020	210 210 210	211	212 212		313 313	310	321	450	370	371 371 371	402	404	520/ 620	522/622	570/ 670	604	711 790	
Fall 2020	210 210 210	211	212 212 212	213 213		310	320	350	470		402	403	521/ 621	511/611			716	744
Spring 2021	210 210 210	211	212 212		313 313	310	321	450	370	371 371 371	402	404	520/ 620	523/623	570/ 670	604	714	
Fall 2021	210 210 210	211	212 212 212	213 213		310	320	350	470		402	403	521/ 621	525/625			712	744
Spring 2022	210 210 210	211	212 212		313 313	310	321	450	370	371 371 371	402	404	520/ 620	522/622	570/ 670	604	711	
Fall 2022	210 210 210	211	212 212 212	213 213		310	320	350	470		402	403	521/ 621	511/611			716	744
Spring 2023	210 210 210	211	212 212		313 313	310	321	450	370	371 371 371	402	404	520/ 620	523/623	570/ 670	604	714	

ARCHITECTURAL ENGINEERING COURSES: MEP & CONSTRUCTION*

Semester	Undergraduate						Graduate								
Fall 2018			403		480	481		561/661					762	780	
Spring 2019	380	381	404	460			560/660		581/681		604		790 (762)		781
Fall 2019			403		480	481		561/661					762	780	
Spring 2020	380	381	404	460			560/660		581/681	582/682	604	(790) 761	762		
Fall 2020	361		403		480	481		561/661					762		
Spring 2021	380	381	404	460			560/660		581/681	582/682	604	761	762		
Fall 2021	361		403		480	481		561/661					762	780	781
Spring 2022	380	381	404	460			560/660		581/681	582/682	604	761	762		
Fall 2022	361		403		480	481		561/661					762	780	
Spring 2023	380	381	404	460			560/660		581/681	582/682	604	761	762		

*Note: CAE 582/682 and CAE 781 are typically offered once every 4 semesters

CIVIL ENGINEERING COURSES: ENVIRONMENTAL AND WATER (INCLUDING RISK)

Semester	Undergraduate							Graduate							
Fall 2018		330	340			403		530/630		540/640	541/641			743	
Spring 2019	240	330			430	404	440					542/642	604	730	
Fall 2019		330	340	345		403		530/630	533/633					735	
Spring 2020	240	330			430	404	440			540/640			604	743	
Fall 2020		330	340			403		530/630			541/641	542/642			
Spring 2021	240	330		345	430	404	440		533/633				604	730	
Fall 2021		330	340			403		530/630		540/640				735	
Spring 2022	240	330		345	430	404	440					542/642	604	743	
Fall 2022		330	340			403		530/630	533/633		541/641				
Spring 2023	240	330		345	430	404	440			540/640			604	730	

*Note: CAE 541/641 and CAE 7xx are typically offered once every 4 semesters

GRADUATE COURSE GROUPS

Courses in gray font are not regularly offered.

A	Group A: 700-level lecture-based CAE courses in civil, architectural, and environmental engineering	
<u>Course</u>	<u>Title</u>	<u>Credits</u>
CAE 702	Finite Element Methods [consider MAE 705 or BME 687 instead]	3
CAE 711	Theory of Elasticity	3
CAE 712	Structural Reliability	3
CAE 714	Structural Dynamics	3

CAE 716	Fracture Mechanics	3
CAE 720	Concrete Materials Science	3
CAE 729	Molecular Modeling of Materials	3
CAE 730	Environmental Hydrology	3
CAE 731	Wastewater Treatment and System Design	3
CAE 732	Water Treatment and System Design	3
CAE 735	Water and Wastewater Engineering: Treatment and Reuse	3
CAE 743	Risk Analysis	3
CAE 744	Risk Management and Resilience	3
CAE 761	Building Information Modeling II	3
CAE 762	Construction Project Management	3
CAE 782	Control Theory and HVAC Applications	3
CAE 790	Advanced Topics	1-3

Group B: 600-level lecture-based CAE courses in civil, architectural, and environmental engineering		
<u>Course</u>	<u>Title</u>	<u>Credits</u>
CAE 610	Structural Mechanics [consider MAE 607 instead]	3
CAE 611	Advanced Structural Analysis	3
CAE 620	Advanced Design of Concrete Structures	3
CAE 621	Advanced Design of Steel Structures	3
CAE 622	Design of Prestressed Concrete Structures	3

CAE 623	Design of Masonry Structures	3
CAE 625	Timber Structural Systems	3
CAE 630	Water Resources Engineering II	3
CAE 631	Surface-Water Hydrology	3
CAE 632	Ground-Water Hydrology	3
CAE 633	Water-Quality Control in Natural Systems	3
CAE 640	Environmental Chemistry	3
CAE 641	Engineering Systems for Disease Control and Bioremediation	3
CAE 642	Solid and Hazardous Waste Engineering	3
CAE 660	Sustainable Construction	3
CAE 661	Computer Aided Architectural Engineering Design	3
CAE 670	Advanced Foundation Engineering	3
CAE 681	Energy-Efficient Building Design	3
CAE 682	Building Energy Modeling and Simulation	3
CAE 690	Special Topics	1-3

Group C: 600- or 700-level CAE courses in Construction Management

<u>Course</u>	<u>Title</u>	<u>Credits</u>
CAE 665	Facilities Operation and Management	3
CAE 669	Construction Management Seminars	1
CAE 691	Special Topics in Construction Management	1-3

CAE 765	Construction Accounting and Finance	3
CAE 769	Construction Management Capstone	3
CAE 791	Advanced Topics in Construction Management	1-3

Group D: Any pre-approved graduate course in any UM department, except CAE and UMI

Group E: CAE Independent Study (Special Problems)		
<u>Course</u>	<u>Title</u>	<u>Credits</u>
CAE 695	Special Problems	1-3
CAE 795	Special Problems	1-3

Group F: CAE Master's Thesis		
<u>Course</u>	<u>Title</u>	<u>Credits</u>
CAE 810	Master's Thesis	1-6

Group G: CAE Master's Design Project		
<u>Course</u>	<u>Title</u>	<u>Credits</u>
CAE 604	Master's Design Project	3

Group H: CAE PhD Dissertation		
<u>Course</u>	<u>Title</u>	<u>Credits</u>
CAE 830	Pre-Candidacy Doctoral Dissertation	1-12

CAE 840	Post-Candidacy Doctoral Dissertation	1-12
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GRADUATE COURSES RELEVANT TO CAE

- **Biomedical Engineering (BME)**

BME 522/622 Scanning Electron Microscopy for Engineers; 3 credits Spring Semester

Physics of transmission and scanning electron microscopy including x-ray spectroscopic analysis. Students will learn to independently operate and use the SEM for imaging in its role in research and engineering. Each student will be responsible for several imaging assignments and an independent research project related to their field of interest.

BME 587/687 Finite Element Analysis for Engineers; 3 credits Fall & Spring Semester

Introduction to the finite-element method. Hands-on applications of FEMLAB software to the analysis of structural, thermal, chemical, electro-magnetic, optical, and fluid flow problems. PREREQUISITE: MTH 311

- **Mechanical and Aerospace Engineering (MAE)**

MAE 501/601 Methods of Engineering Analysis; 3 credits Fall Semester

Analysis of engineering systems in equilibrium and motion. Examples considered from mechanical, electrical, thermal and fluids engineering. Mathematical theory and computer methods for obtaining numerical solutions are developed for various cases involving discrete and continuous systems. Lecture, 3 hours. PREREQUISITE: MAE 412, MTH 311 OR PERMISSION OF THE INSTRUCTOR.

MAE 502/602 Vibrations; 3 credits Fall Semester

Basic theory of free and forced vibrations of mechanical systems with and without damping. Applications to systems with one and several degrees of freedom are included. PREREQUISITE: MAE 202, 207, 412 OR PERMISSION OF INSTRUCTOR.

MAE 507/607 Advanced Mechanics of Solids; 3 credits Spring Semester

Course discusses the basic elements of elasticity, plasticity, and viscoelasticity. Application to mechanical systems at rest and in motion are included. PREREQUISITE: MAE 202, 207, SENIOR STANDING OR PERMISSION OF INSTRUCTOR.

MAE 512/612 Intermediate Fluid Mechanics; 3 credits Fall Semester

Course topics include conservation of mass, momentum, and energy, potential flow, viscous laminar and turbulent flows, the Reynolds analogy, and Boundary-layer approximations. Gas dynamics are also discussed. PREREQUISITE: MAE 309.

MAE 516/616 Introduction to Composite Materials 3 credits Offered By Announcement Only

Course provides an introduction to composite materials and terminology. Topics include advantages offered by composite materials, current aerospace, automotive, and bio-mechanics applications, experimental results, analytical models, and effects of impact and fatigue loads. The environment's impact on composite materials' performance and design procedures are discussed. Case studies examining composite materials as efficient replacements are also included.

MAE 705 Finite Element Methods in Mechanical and Aerospace Engineering; 3 credits Spring Semester

Finite-element analysis methods for static and dynamic analysis of mechanical and aerospace structures, heat transfer analysis, and fluid flow applications. Primary emphasis is placed on underlying mechanics and numerical techniques. Consideration is also given to the use of existing programs, such as ANSYS, NASTRAN and FIDAP, designing proper meshes, and choosing the proper element. A term project is included. PREREQUISITE: MAE 501, 507 OR PERMISSION OF INSTRUCTOR.

MAE 706 Experimental Methods in Fluid Mechanics; 3 credits Offered By Announcement Only

Course topics include methods of flow visualization, laser techniques in measurement of wall motions, conduit compliance, Newtonian and non-Newtonian properties of fluids, measurement of unsteady flow and pressure, laser Doppler anemometry, ultrasound Doppler velocimetry, electro-magnetic flowmetry, measurement of steady and unsteady wall shear stresses and boundary layers. PREREQUISITE PERMISSION OF INSTRUCTOR.

MAE 714 Computational Fluid Dynamics; 3 credits Spring Semester

Incompressible flow equations in rectangular co-ordinates. Topics include basic computational methods for incompressible flow, three dimensional flows, compressible flow equations in rectangular coordinates, basic computational methods for compressible flows, treatment of shocks, artificial viscosities, convergence, other mesh systems, programming, testing, and information processing. PREREQUISITE: MAE 512.

- **Industrial Engineering (IEN)**

IEN 712 Design of Experiments; 3 credits Fall Semester

Design and analysis of experiments, randomized blocks, Latin Squares, factorials, multiple correlation and regression, and application to response surfaces are discussed. PREREQUISITE: IEN 311 or MAS 311 or equivalent.

- **Mathematics (MTH)**

MTH 624 Introduction to Probability; 3 credits Fall Semester

Probability spaces, random variables, expectation, limit theorems. PREREQUISITE: MTH 224, MTH 310.

MTH 642 Statistical Analysis; 3 credits Fall Semester

Statistical inference about one or two populations from interval, ordinal and categorical data; analysis of variance; simple and multiple linear regression; designing research studies. PREREQUISITE: MTH 210, MTH 224