UNIVERSITY OF MIAMI
COLLEGE of ENGINEERING

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

Last Updated: **June 3, 2021**

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 and Construction
- 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	210 210 210	211	212 212		313 313	310	321	450	370	371 371 371	402	404	520/620	590/690	604	711

CIVIL ENGINEERING COURSES: STRUCTURES / GEOTECHNICAL / TRANSPORTATION

Semester	Undergraduate												Graduate					
~~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			712 702 729	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	604 605	711	
Fall 2022	210 210 210	211	212 212 212	213 213		310	320	350	470		402	403	521/ 621	511/611		605	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	604 605	714	
Fall 2023	210 210 210	211	212 212 212	213 213		310	320	350	470		402	403	521/ 621	525/625		605	712 729	744
Spring 2024	210 210 210	211	212 212		313 313	310	321	450	370	371 371 371	402	404	520/ 620	522/622	570/ 670	604 605	711 702	

ARCHITECTURAL ENGINEERING COURSES: MEP AND CONSTRUCTION*

Semester	Undergraduate						Graduate								
~~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		
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

GRADUATE COURSE GROUPS

Courses in gray font are not regularly offered.

A	Group A: 700-level lecture-based CAE courses in civil and architectural engineering	
Course	**Title**	**Credits**
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 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

B	Group B: 600-level lecture-based CAE courses in civil and architectural engineering	
Course	**Title**	**Credits**
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 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

C	Group C: 600- or 700-level CAE courses in Construction Management	
Course	**Title**	**Credits**
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

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

E	Group E: CAE Independent Study (Special Problems)	
Course	**Title**	**Credits**
CAE 695	Special Problems	1-3
CAE 795	Special Problems	1-3

F	Group F: CAE Master's Thesis	
Course	**Title**	**Credits**
CAE 810	Master's Thesis	1-6

G	Group G: CAE Master's Design Project	
Course	**Title**	**Credits**
CAE 604	Master's Design Project (only allowed for students in the 5-year BS/MS program)	3
CAE 605	Master's Project	3

H	Group H: CAE PhD Dissertation	
Course	**Title**	**Credits**
CAE 830	Pre-Candidacy Doctoral Dissertation	1-12
CAE 840	Post-Candidacy Doctoral Dissertation	1-12

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 sheer 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 or ISE)**

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