GRADUATE PROGRAM HANDBOOK

Department of Civil and Environmental Engineering

ACADEMIC YEAR
2023-2026

MORGAN STATE UNIVERSITY

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

MORGAN STATE UNIVERSITY

SCHOOL OF ENGINEERING

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

2023-2026

HANDBOOK FOR GRADUATE PROGRAM

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

Graduate School Application

Please follow the procedures to complete your application.

https://www.morgan.edu/school-of-graduate-studies/admissions/application-process

Application deadlines for the School of Graduate Studies (SGS) are as follows (unless earlier deadline dates are indicated by the individual programs): All deadlines are determined by the programs, not the School of Graduate Studies. If you would like to request an extension, you must contact that department, their information is listed here.

These deadlines apply to every academic year and program unless otherwise indicated.

US Citizen / Permanent Resident, degree-seeking - Spring - December 1 (for all programs unless other deadline dates are indicated by the individual programs)

International, degree-seeking (All F-1 in and out of USA) Spring - November 1 (for all programs unless other deadline dates are indicated by the individual programs)

Non-degree-seeking (US Citizen and Permanent Residents only)- Spring - January 8 / Fall August 1

US Citizen / Permanent Resident, degree-seeking - Fall - May 1 (for all programs unless other deadline dates are indicated by the individual programs)

International, degree-seeking (All F-1 in and out of USA) Fall - April 1 (for all programs unless other deadline dates are indicated by the individual programs)

Academic Calendar

You can find schedules for classes, holidays, events, and deadlines under academic calendars.

https://www.morgan.edu/academic-calendar

DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING

A Welcome Letter from the Department Chair:

Congratulations on your being accepted into the civil engineering graduate program in the School of Engineering! On behalf of the Department of Civil and Environmental Engineering family (faculty and staff), I extend a warm welcome to you on joining our CEE graduate program. Your graduate study in civil engineering will advance your academic pursuit along your professional career.

We have set high standards in the Department of Civil and Environmental Engineering. Therefore, I encourage you to interact with your fellow engineering graduate students and faculty members. Your graduate study in civil engineering at Morgan State University will be built on the following seven primary sub-disciplines: environmental engineering, geotechnical engineering, hydraulic/hydrological engineering, structural engineering, transportation engineering, construction engineering and earthquake engineering. A thorough grounding in these seven major tracks will provide you with an excellent background for other areas of civil engineering. In fall 2023 we started to offer a graduate program, Doctor of Philosophy (Ph.D.) in Sustainable and Resilient Infrastructure Engineering (SRIE) with a pass-through Master of Science (M.S.) in SRIE.

Likewise, it is important for you to know that the American Society of Engineers has gone on record as endorsing the concept of the Master's degree or Equivalent as a prerequisite for the practice of civil engineering at the professional level means to practice as a licensed Professional Engineer (PE). "No other engineering discipline requires that licensure as a Professional Engineer serves as a prerequisite to the sustained practice of civil engineering at the professional level." Moreover, a world-class civil engineering education requires world-class facilities. MSU's Department of Civil and Environmental Engineering occupies with the School of Architecture and Planning, the Department of Transportation and Urban Infrastructure Studies, and the National Transportation Center, a $63,000,000 LEEDS Gold Certified building with 15 civil engineering undergraduate, graduate, and faculty laboratories which include an earthquake shake table (which can move in 6 directions) and two wind tunnels both (subsonic and supersonic).

Welcome aboard for what I am certain will be an enriching educational experience if you honestly apply toward the educational task at hand.

Yours Sincerely,

Jiang Li, Ph.D., P.E., P.HG, D.WRE, F.EWRI, F.ASCE
Chair and Professor of Department of Civil and
Environmental Engineering US-DOE Samuel P. Massie
Chair of Excellence

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0. INTRODUCTION TO GRADUATE PROGRAMS IN CIVIL AND ENVIRONMENTAL ENGINEERING

The School of Engineering's graduate program (within the School of Graduate Studies) provides a vehicle for the Department of Civil and Environmental Engineering (DCEE) to offer broad but comprehensive interdisciplinary Master of Engineering (M.Eng.), Doctor of Engineering (D.Eng.) degrees. In Fall 2023 DCEE started its Doctor of Philosophy (Ph.D.) in Sustainable and Resilient Infrastructure Engineering (SRIE) program with a pass-through Master of Science (M.S.) in SIRE. The DCEE has positioned itself to offer comprehensive, innovative programs in advanced engineering education and research. At the graduate level, the DCEE provides each student with a new blend of skills and a broad but comprehensive, interdisciplinary advanced engineering education which is required of the engineer who practices in the civil engineering related disciplines in the 21st century. Civil engineering-related concentrations include, Structural Engineering, Structural Mechanics, Geotechnical Engineering, Geomechanics, Transportation Engineering, Environmental Engineering, Hydraulic/Hydrologic Engineering, Water Resources, Geohydrology, Hydrology, Construction Engineering and Management, and Infrastructure Engineering and Planning.

1. MASTER OF ENGINEERING BEYOND OF BACHELOR OF SCIENCES

1.1 Purpose

The primary purpose of the Master of Engineering Degree program is to prepare individuals for the practice of engineering. The program emphasizes the theory and application of advanced engineering principles utilizing the most advanced computational and analytical methods and tools. The goal of the program is to produce forward-looking engineering professionals who are capable of making significant contributions to society, while safeguarding the environment. Preference for admission to the Master of Engineering Degree program is given to those persons who hold a Baccalaureate Degree from an accredited undergraduate engineering degree program. Applicants who are graduates of computer science, mathematics, physics, and other science and mathematics related fields will be considered. The Master of Engineering Degree study program is intended for those persons who plan to practice engineering in industry, government, and academe or as entrepreneurial professionals. This degree program may also serve as the initial step towards the doctorate for those who are inclined to advance their knowledge of technological, managerial and engineering design and practice-based concepts. The program provides three distinct program options that allow the student to develop a program that suits his or her professional objectives.

1.2 Objectives

The M.E. in the civil engineering degree program is designed to:

- Support the student to be successful in his/her academic and professional objectives;
- Provide program options that can be adapted to fit student's goals and needs;
- Develop an appreciation of the importance of a closer relationship between engineering education and engineering practice;
- Develop an appreciation for engineering design and for the product/process realization continuum;
- Develop a consciousness for and commitment to the importance of life-long learning;
- Provide a complement to basic research-oriented graduate degree programs;
- Develop a philosophy for the role of research, application, and the environment in the product/ process realization cycle;
- Provide an innovative path to the terminal degree; and
- Generate a cadre of well-trained engineering professionals.

1.3 Admission

Admission requirements to the M. Eng. degree program are commensurate with the admission requirements of the School of Graduate Studies. Exceptional students who possess a GPA of 3.5 or greater in their major area of study and 3.5 GPA or better overall may apply for unconditional admission into the program at the beginning of their senior year. Applicants holding degrees in computer science, mathematics, physics, and other science and mathematics-related fields and who are currently pursuing careers closely aligned with engineering will be considered for admission to the program. Applicants holding degrees in fields other than engineering, mathematics

and science may be considered for admission to the program, given that they have the requisite mathematics and science foundation. An applicant who has deficiencies in foundation courses, as defined by an advisor or departmental committee, may be required to complete successfully a number of undergraduate courses with a goal of meeting minimum departmental requirements. Undergraduate courses, taken for this purpose, may not be used to fulfill any of the requirements for the master's degree. In addition, applicants must satisfy other requirements as specified by the School of Graduate Studies.

1.4 General Requirements

All candidates who seek to earn the Master of Engineering degree will be required to complete one of the three options identified below:

Table 1. Master of Engineering Degree Options in Civil Engineering

	Program Option	SEO Core Courses	Required CEE Core Courses from a Track	CEE Electives	Other	Total Credits
Plan A	Project Report	9 Credits	9 Credits	9 Credits	Project Report (3)	30
Plan B	Thesis	9 Credits	9 Credits	9 Credits	Thesis Defense (3)	30
Plan C	Course Only	9 Credits	9 Credits	12 Credits	None	30

Each student will select one of the three options in collaboration with a faculty advisor. All departments may not offer all of these options. At the time of application, the School of Engineering will notify students of the available options.

The M.E. program in Civil and Environmental Engineering will provide the degree work plan in the following tracks:

1. Structural Engineering,
2. Geotechnical Engineering,
3. Transportation Engineering,
4. Environmental Engineering,
5. Hydrologic/Hydraulic/Water Resource Engineering,
6. Construction Engineering and Management,
7. Earthquake Engineering

At least one track is required with the **minimum of three required core courses** in each track must be taken from that track, which are different from the three core courses required by SOE (i.e., CEGR 514, IEGR 512 and EEGR 505). The electives can be from the same or different tracks.

1.5 Program of Study

A core requirement of three interdisciplinary courses (9 credit hours) will be required of all students entering at the master's level. These courses are carefully designed and coordinated to stress the interdisciplinary nature of the subject matter. The content serves as the philosophical foundation on which all other materials tailored for a specific student are based. The courses are as follows:

CEGR 514	3
EEGR 505	3
IEGR 512	3
Total Credit Hours	9

The interdisciplinary 9-credit core courses can be switched out (with Department Chairperson approval) to a different set of interdisciplinary 9 credits using other courses outside of Department. All remaining 21 credits (70%) must be courses taken within the SOE Department of enrollment. Elective credits are directed toward building strength in a sub-discipline. For example, the following civil engineering-related sub- disciplines are available: applied mechanics, environmental engineering, geomechanics, geotechnical engineering, groundwater hydrology, hydrology, infrastructure planning and engineering, structural engineering, structural mechanics, and transportation engineering. The maximum 6 credit hours for two out of CEE Department or School of Engineering courses, which are related to engineering, are allowed with permission from the student's advisor and approval from the department chair.

Below are the courses by CEE areas of track.

Required Core Courses in Tracks

Structural Engineering
CEGR 628: Bridge Engineering
CEGR 629: Advanced Structural Steel
CEGR 630: Finite Element Analysis
CEGR 634: Prestressed Concrete Design
CEGR 635: Advanced Reinforced Concrete Design

Geotechnical Engineering
CEGR 730: Constitutive Laws in Geomechanics
CEGR 731: Advanced Soil Mechanics I
CEGR 745: Advanced Analysis of Slope Stability
CEGR 748: Design of Pile Foundation

Transportation Engineering
CEGR 659: Pavement Analysis and Design
CEGR 661: Airport Planning and Engineering
CEGR 680: Highway Infrastructure Management System
CEGR 681: Theory of Traffic Flow

Environmental Engineering
CEGR 510: Principles of Environmental Engineering I
CEGR 610: Stormwater Management
CEGR 612: Stormwater Modeling
CEGR 613: Physical-Chemical Treatment of Waste and Wastewater I
CEGR 673: Advanced Environmental Engineering Design

Hydrologic/Hydraulic/Water Resource Engineering
CEGR 615: Open Channel Hydraulics
CEGR 626: Surface Water Hydrology
CEGR 619: Modeling of Groundwater Flow
CEGR 687: Groundwater Hydrology

Earthquake Engineering
CEGR 631: Structural Dynamics
CEGR 665: Random Vibrations and Nonlinear Dynamics
CEGR 702: Seismic Design
CEGR 749: Earthquake Engineering

Construction Engineering and Management
CEGR 645: Construct Project Administration and Management
CEGR 646: Construction Engineering and Management for Engineering
CEGR 755: Construction Cost Management
CEGR 765: Law for Architects, Business, Engineers and Construction Managers

Elective Courses in tracks

Structural Engineering
CEGR 590: Smart Material Systems
CEGR 630: Finite Element Analysis
CEGR 631: Structure Dynamics
CEGR 533: Matrix Structural Analysis
CEGR 628: Bridge Engineering
CEGR 629: Advanced Structural Steel
CEGR 634: Prestressed Concrete Design
CEGR 635: Advanced Reinforced Concrete Design
CEGR 665: Random Vibrations and Nonlinear Dynamics

CEGR 690: Adaptive Structures
CEGR 691: Spacecraft Dynamics and Control
CEGR 692: Theory of Elastics
CEGR 695: Concrete-Time Control Engineering
CEGR 702: Seismic Design
CEGR 703: Geometrically Nonlinear Structural Analysis
CEGR 704: Innovations in Structural Steel Design

Geomechanics and Geotechnical Engineering
CEGR 688: Advanced Mechanics of Solids
CEGR 705: Mechanics of Composite Materials
CEGR 709: Wave Propagation in Elastic Media
CEGR 723: Advanced Consolidation Theory
CEGR 725: Aquifer Mechanics
CEGR 726: Geosynthetics
CEGR 730: Constitutive Laws in Geomechanics
CEGR 731: Advanced Soil Mechanics I
CEGR 737: Continuum Mechanics
CEGR 738: Boundary Element Method in Geomechanics
CEGR 739: Discrete Element Method in Geomechanics
CEGR 743: Finite Element Method in Geomechanics
CEGR 744: Tensor Analysis in Geomechanics
CEGR 745: Advanced Analysis of Slope Stability
CEGR 746: Advanced Soil Dynamics
CEGR 748: Design of Pile Foundation
CEGR 749: Earthquake Engineering
CEGR 750: Advanced Geotechnical Experiments

Transportation Engineering
CEGR 651: Computer Aided Highway Engineering Design
CEGR 655: Traffic Engineering I
CEGR 656: Transportation Models and Simulation Analysis I
CEGR 657: Advanced Topics in Traffic Engineering
CEGR 659: Pavement Analysis and Design
CEGR 661: Airport Planning and Engineering
CEGR 670: Special Topics in Highway Safety
CEGR 671: Traffic Flow Theory
CEGR 680: Highway Infrastructure Management System
CEGR 681: Theory of Traffic Flow
CEGR 684: Advanced Algorithms in Transportation I
CEGR 685: Advanced Algorithms in Transportation II
CEGR 686: Demand Analysis and Forecasting
CEGR 697: Geographic Information System Applications in Transportation

Environmental Engineering
CEGR 510: Principles of Environmental Engineering I
CEGR 511: Principles of Environmental Engineering II
CEGR 512: Principles of Environmental Engineering III
CEGR 513: Environmental Chemistry and Microbiology
CEGR 514: Environmental Impact and Risk Assessment
CEGR 531: Reliability Analysis for Infrastructure and Environmental Systems
CEGR 613: Physical-Chemical Treatment of Waste and Wastewater I
CEGR 614: Physical-Chemical Treatment of Waste and Wastewater II
CEGR 616: Biochemical Processes in Environmental Engineering
CEGR 617: Advanced Biochemical Processes in Environmental Engineering
CEGR 663: Readings in Environmental Engineering
CEGR 673: Advanced Environmental Engineering Design

Hydrology/Hydraulic/Water Resources Engineering
CEGR 610: Stormwater Management
CEGR 611: Hydrologic Modeling
CEGR 612: Stormwater Modeling
CEGR 615: Open Channel Hydraulics
CEGR 619: Modeling of Groundwater Flow
CEGR 620: Modeling of Groundwater Pollutant Transportation
CEGR 623: Hydrodynamics
CEGR 624: Hydrostatistics
CEGR 625: Modeling of Surface Water
CEGR 626: Surface Water Hydrology
CEGR 627: Introduction to Multiphase Flow
CEGR 687: Groundwater Hydrology
CEGR 747: Well Hydraulics

Construction Engineering and Management
CEGR 645: Construct Project Administration and Management
CEGR 646: Construction Engineering and Management for Engineering
CEGR 755: Construction Cost Management
CEGR 756: Advanced Construction Cost Management
CEGR 760: Dissertation Research & Writing for Construction Students
CEGR 765: Law for Architects, Business, Engineers and Construction Managers

Other Electives
CEGR 531: Reliability Analysis for Infrastructure and Environmental Systems
CEGR 636: Artificial Neural Networks I
CEGR 638: Artificial Neural Networks II
CEGR 695: Discrete-Time Control Engineering
CEGR 740: Special Topics in Geographic Information System (GIS)
CEGR 780: MSU/JHU Education Engineering Study
CEGR 790: Research in Civil Engineering I
CEGR 791: Research in Civil Engineering II
EEGR 505: Advanced Engineering Mathematics with Computational Methods
IEGR 512: Advanced Project Management

FOR THESIS STUDENTS:
Upon achieving Master's Candidacy, the student will continuously register in Fall and Spring terms for CEGR 797 (Thesis Guidance) until the Master's Thesis is completed and submitted to the School of Graduate Studies for review. The course is used only when the curriculum is near completion, and the student is completing the research and writing of the thesis. The course registration maintains the student status as a matriculated, full-time student (student is registered for 3 credit hours and the system reports a full-time 9 credit hour load). After the Intent to Defend the Master's Thesis form has been accepted by the School of Graduate Studies, this course registration will be changed by the School of Graduate Studies to CEGR 799 (Thesis Defense) for the given semester and count for 3 credit hours of curricular coursework (CEGR 799 will also count for 9 credit hours of load). Other courses cannot be substituted for CEGR 797 (Thesis Guidance). The only eligible grade for CEGR 797 (Thesis Guidance) is the grade of "S" and the only acceptable grade for CEGR 799 (Thesis Defense) is "P/F" (Pass/Fail). THESIS students should not be signing up for any 799 course as a result.

FOR DOCTORAL STUDENTS:
Upon achieving Doctoral Candidacy, the student will continuously register in Fall and Spring terms for CEGR 997 (Dissertation Guidance) until the Dissertation is completed and submitted to the School of Graduate Studies for review. The course is used only when the curriculum has been completed, candidacy has been achieved, and the student is completing the research and writing of the Dissertation. The CEGR 997 course registration maintains the student status as a matriculated, full-time student (student is registered for 3 credit hours and the system reports a full-time 9 credit hour load).

After the Intent to Defend the Dissertation form has been received by the School of Graduate Studies, this course

registration will be changed by the School of Graduate Studies to CEGR 998 (Dissertation Defense) for the given semester and count for 3 credit hours of curricular coursework (CEGR 998 will also count as 9 credits of load). CEGR 997 will not count toward curricular credits. Other courses cannot be substituted for CEGR 997 (Dissertation Guidance). The only eligible grade for CEGR 997 (Dissertation Guidance) is the grade of "S" and the only acceptable grade for CEGR 998 (Dissertation Defense) is "P/F" (Pass/Fail). DOCTORAL students should not be signing up for any 998 courses as a result.

1.6 Study Plan

To assure that students plan their work properly with appropriate advice from the faculty, every student enrolled in the graduate program is required to fill the Master Study Plan Form. Not every course is offered every term. At the initial conference with an advisor, an initial plan of study will be established, and submitted when registering for first semester courses to the graduate program coordinator of civil engineering and the department office for placement in the student's official file. At this time, any anticipated exceptions or anticipated transfer credits will be noted. This plan must be updated every semester. The plan must be approved by the student's faculty adviser before a copy is submitted to the graduate program coordinator of civil engineering and the department office.

Master Study Plan Form (3 Options) for
Master of Engineering in Department of Civil and Environmental Engineering

Name:			
	First	**MI**	**Last**
Address			
Student ID #		**Phone**	
Email			
Degree Program		**Concentrated Area**	
Faculty Advisor			
Faculty Advisor's Signature		**Date**	

COURSE NAME	**CREDITS**	**SEMESTER/YEAR**
General Core Courses for ME Required by SOE (9 credits)		
CEGR 514 Environmental Impact and Risk Assessment	3	/
EEGR 505 Advanced Engineering Mathematics with Computational Methods	3	/
IEGR 512 Advanced Project Management	3	/
Required Core Courses from a CEE Track (9 credits[1])		
CEGR TTT	3	/
CEGR TTT	3	/
CEGR TTT	3	/
Elective Courses (9 credits[2&3])		
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
Take One of Three Plans A, B or C below (3 credits each)		
Plan A: Project Report, CEGR795 Project Report	3	/
Plan B: Thesis**,** CEGR799 Thesis Defense[4]	3	/
Plan C: Courses only**, CEGR YYY** elective	3	/
Total Credits for Each Option	**30**	

Note: One may take Plan A, B or C with a total of 30 credits.

1. One has to take 3 CEGR TTTs as required core courses from one of seven CEE tracks.
2. One may take two courses from a different track as a minor.
3. One can take up to one non-CEGR YYY elective with advisor's approval.
4. For Thesis Option one may be encouraged to take 6 credits hours of CEGR 790 & CEGR 791 as elective courses.

Example for a student's track on Geotechnical Engineering with Plan A:

Master Study Plan Form (3 Options) for
Master of Engineering in Department of Civil and Environmental Engineering

Name:			
	First	**MI**	**Last**
Address			
Student ID #		**Phone**	
Email			
Degree Program	**Master of Engineering**	**Concentrated Area**	*Geotechnical Engineering*
Faculty Advisor			
Faculty Advisor's Signature		**Date**	

COURSE NAME	**CREDITS**	**SEMESTER/YEAR**
General Core Courses for ME Required by SOE (9 credits)		
CEGR 514 Environmental Impact and Risk Assessment	3	Fall /2018
EEGR 505 Advanced Engineering Mathematics with Computational Methods	3	Fall/2018
IEGR 512 Advanced Project Management	3	Spring/2019
Required Elective Courses from a CEE Track (9 credits[1])		
CEGR 731 Advanced Soil Mechanics I	3	Fall/2018
CEGR 745 Advanced Analysis of Slope Stability	3	Spring/2019
CEGR 748 Design of Pile Foundation	3	Spring/2019
Elective Courses (9 credits[2&3])		
CEGR 743: Finite Element Method in Geomechanics	3	Fall/2019
CEGR 687: Ground Water Hydrology	3	Fall/2019
CEGR 742: Geographic Information System (GIS) Modeling in Raster	3	Spring/2020
Take One of the Three Plans A, B or C Below (3 credits)		
Plan A: Project Report, CEGR795 Project Report (3)	3	Fall/2019
Plan B: Thesis, CEGR 797/799 Thesis Defense[4]	3	N/A
Plan C: Courses only, **CEGR YYY**(3) CEE electives	3	N/A
Total Credits for Each Option	**30**	

Note: One may take Plan A, B or C with a total of 30 credits.

1. One has to take 3 CEGR TTTs as required core courses from one of seven CEE tracks.
2. One may take two courses from a different track as a minor.
3. One can take up to one non-CEGR YYY elective with advisor's approval.
4. For Thesis Option one may be encouraged to take 6 credits hours of CEGR 790 & CEGR 791 as elective courses.

2 DOCTOR OF ENGINEERING BEYOND BACHELOR OF SCIENCES

2.1 Purpose

The purpose of the Doctor of Engineering program is to prepare students beyond the application of advanced engineering principles to the ability to perform independent research, problem definition and problem solving. The goal of this program is to produce engineering professionals who are leaders in their fields of academic and applied engineering. The Program leading to the degree of Doctor of Engineering is formally affiliated with the department where activities are most closely related to an applicant's advanced study goals. However, the range of inquiry may (and is encouraged to) cross traditional departmental and school lines such that research and practical experience opportunities are extremely broad, and that highly individualized programs can be pursued.

2.2 Objectives

The Doctor of Engineering program is organized/designed to provide advanced engineering education and experience that are professionally oriented, and which will afford graduate degree engineers the opportunity to develop into strong engineering professionals, applied researchers, managers of technology, technically trained educators, and technological advocates. The Doctor of Engineering program is characterized, in large part, by the special nature of the dissertation. As part of the dissertation development process, the student may be required to work with industry, governmental agency, or consulting engineering firm to develop a dissertation topic that is tailored individually to the student. The planning of content for this experience is done in conjunction with the faculty and corporate (government) advisor(s). All parties (student, faculty advisor, corporate advisor) will work together to meet the needs of the student the academic and professional standards of the university, and the competitive posture of the involved corporation (government agency) respectively.

2.3 Admission

Admission to the doctoral program will be considered for those persons who possess the following qualifications: Preference for admission to the Doctor of Engineering program is given to those persons who hold a Master's Degree from an accredited graduate engineering degree program. Applicants holding master's degrees in computer science, physics, and other science and mathematics-related fields and who are currently pursuing careers closely aligned with engineering will be considered for to the Doctoral Program on a case by case basis.

- Exceptional students, upon the recommendation of a faculty committee, who are graduates with a Baccalaureate Degree from ABET accredited Engineering programs/schools, may apply and be considered for admission to the Doctoral Program. Students, with Baccalaureate Degrees, who have completed 18 credit hours of Master Degree work with a Grade Point Average (GPA) of 3.5 or greater, may apply to the Doctoral program.
- Applicants for the Doctor of Engineering Program must have a minimum, cumulative 3.0 GPA on an overall on a 4.0 scale, at the graduate level.
- The Graduate Record Examination (GRE) is not required prior to acceptance into the program, however it must be taken within two years after matriculation in the program.
- Three letters of recommendations from practicing engineering or other professionals and/or academicians.
- A letter/essay expressing interest in the doctoral program and describing career objective plans and reasons for desiring admission to the Doctoral Program.
- In addition: All applicants must satisfy the application requirements of the School of Graduate Studies and Research.

2.4 General Requirements

General Requirements for the Doctor of Engineering Degree

- All candidates for the Doctor of Engineering degree must complete the required program of coursework and research described below.
- All candidates must pass an Admission to Candidacy examination. In addition, when required by the student's Advisory/Doctoral committee, the student must take and pass a Preliminary examination.

- All candidates must submit a doctoral dissertation. When the dissertation has been completed to the satisfaction of the committee chairperson, a dissertation defense will be scheduled at which time the student must orally defend his or her work before the entire Doctoral Advisory committee.
- All requirements for the doctoral degree in Engineering must be completed within a period of seven consecutive years from the date of admission.
- All candidates are expected to participate in experiences in academia, industry or a government agency, or as required by the candidate's Advisory or Doctoral Committee.
- All candidates must satisfy residency requirements.
- All candidates must maintain a minimum grade point average of 3.0 throughout the program.

There are no foreign language requirements for this program.

2.5 Residency Requirements

All candidates must satisfy 18 credit hours of residency requirements in one of the following ways: Full- time candidates for the Doctor of Engineering degree will satisfy residency requirements by enrolling in nine (9) credit hours per semester, for two (2) consecutive semesters. Part-time candidates for the Doctor of Engineering degree will satisfy residency requirements by enrolling in six (6) credit hours per semester, for three (3) consecutive semesters. Upon completion of course requirements and all required examinations, the candidate must continue to register for "Dissertation Guidance" each semester until the dissertation is successfully completed.

2.6 Program of Study

The program of study for the candidate will be prescribed on an individual basis. The candidate's undergraduate degree track, master's degree track, professional engineering-related experience, and future goals are taken into consideration in creating a program of study. The maximum 9 credit hours for three out of CEE Department or School of Engineering courses, which are related to engineering, are allowed with permission from the student's advisor and approval from the department chair.

2.7 Notice of Intention

Students who have completed at least 12 semester hours, and have attained a cumulative grade at least above 3.2, may file notice of intention to become a candidate for the Doctor of Engineering (D.Eng.) with the CEE Department. If a student already enrolled as a candidate for the Master's degree wishes to file notice to become a candidate for the D.Eng., the student must re-apply. The notice of intention must include a plan of study with a concentrated area and approved by the Advisory Committee. At least 3 committee members are required to be from the Department of Civil and Environmental Engineering. One committee member must be from outside of the Department of Civil and Environmental Engineering

Notice of Intention for Doctor of Engineering Candidate
Department of Civil and Environmental Engineering

Name:			
	First	**MI**	**Last**
Address			
Student ID #		**Phone**	
Email			
Concentrated Area			
Thesis Title			

EXAM COMMITTEE: Minimum of four voting members required where at least three (3) are members of the Department of Civil and Environmental Engineering extended faculty (regular, affiliate, adjunct, research or emeritus assistant or associate professors), two of whom must be regular full-time faculty, and one committee member must be from outside of the Department of Civil and Environmental Engineering (this is highly recommended for all students).

Date of Exam/ Location		
	Name	**Signature**
Chair		
Committee Member		
Committee Member		
Committee Member		
Committee Member		
External non Civil Faculty Member		
External non Civil Faculty Member		
Department Chair's Approval		

Note:

Are you registered in the term in which you defend? Yes ☐ No ☐
Have you completed at least 12 semester hours in the term in which you defend? Yes ☐ No ☐
Have you attained a cumulative grade point at least above 3.2 Yes ☐ No ☐
Have you turned in your thesis proposal 3 weeks prior to the exam? Yes ☐ No ☐
Have you attached the following documents in PDF format?

I. Current CV of your external committee member Yes ☐ No ☐
II. Copy of your current CV

2.8 Two Tracks Within the Doctoral Program

Track 1: The minimum requirement for a Doctoral Degree is 36 credit hours beyond a Master's Degree. This includes 3 credit hours for the Dissertation Defense (CEGR 998) and up to 6 credit hours of Independent Research Project I (CEGR 790 and CEGR 791) with Research Advisor's approval. The graduate credit hours must be at the 500-600 level and above, with a maximum of 9 credits allowed at the 500 level. The 3 credit hours of Dissertation Defense (CEGR 998) are awarded on completion of the Candidate's Dissertation. After Advancement to Candidacy, the candidate will continue to enroll in the Dissertation Guidance (CEGR 997) every semester until completion of the dissertation requirements.
Graduate credits at the 500-600 equivalent level or higher may be accepted for transfer from a regionally accredited institution for doctoral students. The maximum number of credits will be determined by the program in which the student is enrolled.

Track 2: The minimum requirement for the Doctoral Degree is 60 credit hours beyond a Bachelor's Degree. This includes 3 credit hours for the dissertation (CEGR 998) and up to 6 credit hours of Independent Research Project I (CEGR 790 and CEGR 791) with Research Advisor's approval. This requirement may, however, be increased at the discretion of the student's advisory committee.

Of the 60 credits, a maximum of 39 credits can be at the 500 level; and the remaining 21 credits must be at the 600 level and above. The 3 credit hours of Dissertation Defense (CEGR 998) are awarded on completion of the Candidate's Dissertation. After Advancement to Candidacy, the candidate will continue to enroll in the Dissertation Guidance (CEGR 997) every semester until completion of the dissertation requirements. Graduate credits at the 500-600 equivalent level or higher may be accepted for transfer from a regionally accredited institution for doctoral students. The maximum number of credits will be determined by the program in which the student is enrolled.

2.9 Study Plan

To assure that students plan their work properly with appropriate advice from the faculty, every student enrolled in the graduate program is required to fill Doctoral Study Plan Form. Not every course is offered every term. At the initial conference with an advisor, an initial plan of study will be established, and submits it when registering for first semester courses to the graduate program coordinator of civil engineering and the department office for placement in the student's official file. At this time, any anticipated exceptions or anticipated transfer credits will be noted. This plan must be updated every semester. The plan must be approved by the student's faculty adviser before a copy is submitted to the graduate program coordinator of civil engineering and the department office.

2.10 Admission to Doctorate Candidacy

The Doctoral student has the right to assemble his/her own Doctoral Advisory Committee as well as selecting the major advisor. The committee and the student constitute an independent working unit. This committee, along with the major advisor who serves as the Chair of the committee, guides the student, determines his/her doctoral course work, and sets specific requirements to be followed in order for the student to obtain his/her degree. Students are recommended for a degree when the Committee members agree that an appropriate level of scholarly achievement has been reached in the area of study and that the Doctoral requirements have been satisfied. This committee will consist of four voting members required where at least 3 are members of the Department of Civil and Environmental Engineering extended faculty (regular, affiliate, adjunct, research or emeritus assistant or associate professors), two of whom must be regular full-time faculty, and one committee member must be from outside of the Department of Civil and Environmental Engineering (this is highly recommended for all students). All committee members must be members of the full-time faculty and have doctoral degrees with the exception of the Industry/Government Professional. The graduate student must submit a 'Notice of Intention for Committee' form. Committee appointments are subject to approval of the Committee Chair. This committee must be formed before the student can take the A examination. **No member on the Advisory committee can be changed by the student once the (A) examination has been completed.**

2.11 Examinations

The Doctoral student is required to take two (2) examinations: the Admission to Candidacy (A) examination, and the Dissertation Defense (B) examination. When required by the student's advisory committee, a Preliminary Examination must be passed before taking Examination (A). At the discretion of the advisory committee, the Admission to Candidacy examination can be written, oral, or both written and oral. The Dissertation Defense is oral. The examinations are to be taken in the following manner:

Admission to Candidacy (A) Examination: An admission to candidacy examination will be conducted to judge the candidate's comprehension of graduate course work and the candidate's ability to present and defend the results of independent research. At the time of this examination, the student must make a presentation of his/her proposed research, which presents the underlying engineering technologies and outlines the plan of research. Any deficiencies that may be uncovered must be rectified before a candidate can be permitted to take this examination. This exam is to be conducted by the full Doctoral Advisory Committee. See appendixes A1, A2, A3 and A4 for forms on the Admission to Candidacy (A) examination. Should the student fail this Candidacy Examination, the Doctoral Advisory Committee determines the conditions to be met before a second examination is to be administered. A third examination is prohibited.

Dissertation Defense (B) Examination: All doctoral candidates are to conduct a major research project, the result of which culminates in a dissertation. This dissertation must be a well-reasoned application of advanced knowledge of technology and must show evidence of scholarly attainment in the student's major specialty. The Doctoral Advisory Committee will conduct the dissertation defense examination. This examination will determine the candidate's ability to apply advanced engineering disciplines to problems of substance in a creative and scholarly manner. Prior to the time of the (B) examination, the student must have (at least) submitted a paper of his/her research to a conference or professional journal. Any deficiencies that may have been uncovered in previous examinations must have been rectified before a candidate can be permitted to take his dissertation examination.

At least 45 days prior to the intended date of the (B) examination, a notification of the intent to schedule this Examination must be submitted to the appropriate engineering department. This notification will include a complete preliminary copy of the dissertation written to satisfy the graduate school’s requirements for content and format and be approved by the Major Advisor. A request for Dissertation Defense Examination signed by the candidate and the Major Advisor must be submitted along with Dissertation approval sheet no later than two weeks prior to the scheduled final examination. A final draft copy of the dissertation, written to satisfy the graduate school's requirements for content and format, will be delivered to each member of the Doctoral Advisory Committee at least 10 business working days prior to the examination.

The Dissertation Defense will include a publicly announced presentation of the dissertation where faculty and students will be free to question the research. A separate closed session with the full Doctoral Advisory Committee will follow which may include any additional queries on the research or related engineering principles. If a candidate does not pass the (B) examination unconditionally, upon consensus of the Doctoral Advisory Committee members, the chairperson of the committee will give the Doctoral candidate written recommendations for completion of dissertation requirements.

2.12 Other Miscellaneous Considerations

If a Doctoral candidate goes to industry or government while completing his/her research, an Understanding of Agreement must be drawn up between the company, advisor, and advisee. This agreement outlines the goals and expectations concerning the overview and completion of research dissertation before the advisee leaves. All work will continue to be conducted under the guidance and approval of the Major Advisor in absentia.

2.13 Transfer Credit

Requests for transfer of graduate credits, taken at accredited institutions, prior to enrollment at Morgan, must be approved by the Chair of the department, the Dean of the School in which the student is registered, as well as the Dean of the School of Graduate Studies. Such a request must be made within one semester of

enrollment. Only graduate credits taken at US regionally accredited institutions or credits taken at international institutions and evaluated by WES or ECE as equivalent to US accredited graduate credits, will be considered for transfer. Transfer credits are not counted in the determination of the student's GPA or cumulative GPA.

For master's degree students, a maximum of twenty percent (20%) or 6 of the required curriculum's credit hours may be accepted for external transfer beyond the Bachelor. For doctoral students, the maximum number of 12 required curriculum's credits can be accepted in the D.ENG. program and Ph.D. program. In no case will the number of transfer credits reduce or void institutional or program residency requirements. It should be noted that credits earned for dissertation (and thesis) or internships may not be used to satisfy program residency requirements. See Appendix A5 for Transfer Graduate Course Equivalency Form.

Once admitted to graduate work a student must obtain formal permission from the director of the program in which the student is enrolled, the department chair, the Dean of the School in which the program is located, and Dean of the School of Graduate Studies before enrolling at another institution for a course that is to be offered in fulfillment of degree requirements at Morgan. Such permission is granted only in exceptional instances. To be eligible to receive such permission a student must be in good standing and the courses must be completed within the time period allowed for the completion of degree requirements.

Transfer work, whether taken prior to enrollment or while the student is enrolled at Morgan, must be equal in scope and content to that offered by Morgan and must represent a coherent part of the required program of study. Only courses in which grades "A" or "B" have been earned may be offered for transfer credit. A grade of B- (B minus) is not eligible for transfer. Credits for correspondence courses, workshops, and extension classes are not acceptable for transfer except where allowed by Maryland Higher Education Commission (MHEC) or Board authorized, officially sanctioned program agreements

Doctoral Study Plan Form (for a MS/ME degree holder)

Doctor of Engineering

in Department of Civil and Environmental Engineering

Name:			
	First	**MI**	**Last**
Address			
Student ID #		**Phone**	
Email			
Degree Program		**Concentrated Area**	
Faculty Advisor			
Faculty Advisor's Signature		**Date**	

COURSE NAME	**CREDITS**	**SEMESTER/YEAR**
Three Required Core Courses for a CEE Track (9 credits[1])		
CEGR TTT	3	/
CEGR TTT	3	/
CEGR TTT	3	/
Six Elective Courses (18 credits)		
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
Two CEE Research Courses (6 credits)		
CEGR 790	3	/
CEGR 791	3	/
Dissertation Defense (3 credits)		
CEGR 997/CEGR 998(3)	3	/
Total Credits	**36**	

Note:

1. 9 credit hours of 3 CEE track required courses (i.e., 3 CEGR TTTs from one of seven CEE tracks)
2. 18 credit hours of 6 CEE elective courses (i.e., CEGR YYY electives at 600 level above, of which up to 6 credits can be replaced by non-CEGR YYYs with advisors' approval
3. 6 credit hours of CEGR 790 and CEGR 791 (non-repeatable) for research in CEE are required.
4. Dissertation candidates only sign up for CEGR 997 courses after candidacy. If the dissertation is approved by the School of Graduate Studies when submitted, the School of Graduate Studies will convert the candidate to the appropriate CEGR 998 course as directed by the Program Director.

Doctoral Study Plan Form (for a BS degree holder)
Doctor of Engineering
in Department of Civil and Environmental Engineering

Name:	First	MI	Last
Address			
Student ID #		Phone	
Email			
Degree Program		Concentrated Area	
Faculty Advisor			
Faculty Advisor's Signature		Date	

COURSE NAME	CREDITS	SEMESTER/YEAR
Three Courses for SOE Requirements (9 credits[1])		
CEGR 514	3	/
EEGR 505	3	
IEGR 512	3	
Three Suggested Elective Courses for a CE Track (9 credits[2])		
CEGR XXX	3	
CEGR XXX	3	
CEGR XXX	3	/
Eleven Electives (33 credits)		
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
Two CE Research Courses (6 credits)		
CEGR 790	3	/
CEGR 791	3	/
Dissertation Defense (3 credits)		
CEGR 997/CEGR 998	3	/
Total Credits	60	

Note:

1. 9 credit hours of 3 SOE required courses (i.e., CEGR 513, EENG 505 and IEGR 512)
2. 9 credit hours of 3 CEE track required courses (i.e., 3 CEGR TTTs from one of seven CEE's tracks)
3. 33 credit hours of 11 CE Electives (i.e., CEGR YYYs from CEE electives at 600 level above, of which up to 6 credits can be replaced by non-CEGR YYYs with advisors' approval
4. 6 credit hours of CEGR 790 and CEGR 791 (non-repeatable) for research in CE are required.
5. Dissertation candidates only sign up for 997 courses after candidacy. If the dissertation is approved by the School of Graduate Studies when submitted, the School of Graduate Studies will convert the candidate to the appropriate 998 course as directed by the Program Director.

3 BACHELOR OF SCIENCES TO MASTER OF ENGINEERING (A B.S./M.ENG 4+1YR PROGRAM)

The Department of Civil and Environmental Engineering in School of Engineer at Morgan State University may offer a 4+1 year program of Bachelor of Science/Master of Engineering (B.S./M. Eng). The detail information regarding the B.S./M. E. program is given below.

3.1 Purpose

The purpose of the Bachelor of Science/Master of Engineering (B.S./M.Eng) degree program is to enable well qualified and highly motivated undergraduate students majoring in Civil Engineering to obtain both a bachelor's and master's degree in a minimum of five years. The goal of the B.S./M.Eng program in Civil Engineering is to accelerate the production of civil engineering professionals who are capable of entering into the technology workforce and making significant contributions to society, while safeguarding the environment. For B.S. /M.E. candidates in Civil Engineering, the number of undergraduate electives may be reduced thereby enabling them to begin graduate courses once they have met the general education requirements and the majority of the major requirements of Civil Engineering. After completing their senior year, all subsequent course work should be at the graduate level. Graduate credits may be accepted in fulfillment of some undergraduate requirements. However, the graduate credits once applied to meet undergraduate requirements may not be used again to satisfy graduate requirements.

3.2 Objectives

See Section 1.2.

3.3 Admission

The B.S. /M.E. program allows students to begin graduate study (concurrent with undergraduate work) in the second semester of their junior year. For consideration of admission into the B.S./M.E. program, the application must be submitted in the first instance to the graduate program director of the Department of Civil and Environmental Engineering. Applications determined to be eligible; following consideration by the appropriate committee of the CEE faculty shall be forwarded through the Office of the Associate Dean of the School of Engineering to the School of Graduate Studies.

- Complete 85 credits
- Have a minimum grade point average (GPA) of 3.0.
- Submit a completed application form,
- Submit three (3) written recommendations from MSU faculty, one of which must be from an MSU faculty member within the Department of Civil and Environmental Engineering who would serve as the candidate's advisor, and
- Submit a plan of study, signed by the anticipated advisor, outlining the tentative courses to be pursued in the program and the anticipated track in the program of study.

All applicants must provide a typed statement indicating why they seek to enter the program, and a sample that is representative of their technical work. Acceptance into the program is determined by a B.S. /M.E. Committee in the Department of Civil and Environmental Engineering. The application package is submitted to the School of Graduate Studies.

https://catalog.morgan.edu/preview_program.php?catoid=24&poid=5537&returnto=1680

3.4 General Requirements

All students who seek candidacy into the B.S./M.E. program will be required to complete the B.S. degree requirements of Civil Engineering, and a total of 27 acceptable credit hours of graduate coursework and 3 credit hours of Project Report. **Up to nine credits of graduate coursework may count towards the undergraduate degree.** Successful completion and oral defense of the Report Project is required in lieu of taking a comprehensive examination. A candidate for admission to the program must have a minimum cumulative grade point average of 3.0 at the end of the junior year and must maintain this average in order to remain in the program. Upon admission to the B.S. /M.E. program students must maintain a cumulative grade point average of 3.0 each semester or he or

she will be dismissed from the B.S./M.E. program and thereafter be only eligible to receive the bachelor's degree. This is the minimum requirement for consideration; it does not guarantee admission or retention.

Table 2. B.S. / M. E. Degree in Civil Engineering

Program	SOE Core Courses	CEE Core Course	CEE Selective or Elective	Other	Total Credits
Project Report	9 Credits	9 Credits	9 Credits	Project Report /Thesis/Course (3)	30

3.5 Program of Study

A core requirement of three interdisciplinary courses (9 credit hours) will be required of all students entering at the B.S. /M.E. program. These courses are carefully designed and coordinated to stress the interdisciplinary nature of the subject matter. The content serves as the philosophical foundation on which all other materials tailored for a specific student are based. The courses are as follows:

CEGR 514 `	3
EEGR 505	3
IEGR 512	3
Total Credit Hours	9

Students accepted for candidacy into the B.S./M.Eng program will begin taking these courses in the second semester of their junior year. The remaining 21 credits are directed toward building an interdisciplinary strength in a sub- discipline. Candidates will complete these courses during the fifth year. The courses by area of the track **are the same as in section 1.5.** One pursuing the 4+1 program will be charged with tuition and fees at the undergraduate level during a reasonable period of time.

3.6 Study Plan

See section 1.6.

The 4+1 Program Study Plan Form (3 Options) for B.S./M.ENG Degrees in Department of Civil and Environmental Engineering

Name:			
	First	**MI**	**Last**
Address			
Student ID #		**Phone**	
Email			
Degree Program		**Concentrated Area**	
Faculty Advisor			
Faculty Advisor's Signature		**Date**	

COURSE NAME	**CREDITS**	**SEMESTER/YEAR**
General Core Courses for ME Required by SOE (9 credits[1])		
CEGR 514 Environmental Impact and Risk Assessment	3	/
EEGR 505 Advanced Engineering Mathematics with Computational Methods	3	/
IEGR 512 Advanced Project Management	3	/
Required Core Courses from a CEE Track (9 credits[2])		
CEGR TTT	3	/
CEGR TTT	3	/
CEGR TTT	3	/
Elective Courses (9 credits[3&4])		
CEGR YYY	3	/
CEGR YYY	3	/
CEGR YYY	3	/
Take One of Three Plans A, B or C below (3 credits each)		
Plan A: Project Report, CEGR795 Project Report	3	/
Plan B: Thesis**,** CEGR799 Thesis Defense[5]	3	/
Plan C: Courses only**, CEGR YYY** elective	3	/
Total Credits for Each Option	**30**	

Note: One may take Plan A, B or C with a total of 30 credits.

1. Three CEGR XXX elective undergraduate courses will be replaced with CEGR 514, EEGR 505 and IEGR 512.
2. One has to take 3 CEGR TTTs as core courses from one of seven CEE tracks.
3. One may take two courses from a different track as a minor.
4. One can take up to one non-CEGR YYY elective with advisor's approval.
5. For Thesis Option one may be encouraged to take 6 credits hours of CEGR 790 & CEGR 791 as elective courses.

Example for a student's track on Geotechnical Engineering with Plan A:

The 4+1 Program Study Plan Form (3 Options) for
Master of Engineering in Department of Civil and Environmental Engineering

Name:			
	First	**MI**	**Last**
Address			
Student ID #		**Phone**	
Email			
Degree Program	**Master of Engineering**	**Concentrated Area**	*Geotechnical Engineering*
Faculty Advisor			
Faculty Advisor's Signature		**Date**	

COURSE NAME	**CREDITS**	**SEMESTER/YEAR**
General Core Courses for ME Required by SOE (9 credits)		
CEGR 514 Environmental Impact and Risk Assessment	3	Fall /2018
EEGR 505 Advanced Engineering Mathematics with Computational Methods	3	Fall/2018
IEGR 512 Advanced Project Management	3	Spring/2019
Required Core Courses from a CEE Track (9 credits)		
CEGR 731 Advanced Soil Mechanics I	3	Fall/2018
CEGR 745 Advanced Analysis of Slope Stability	3	Spring/2019
CEGR 748 Design of Pile Foundation	3	Spring/2019
Elective Courses (9 credits)		
CEGR 743: Finite Element Method in Geomechanics	3	Fall/2019
CEGR 687: Groundwater Hydrology	3	Fall/2019
CEGR 742: Geographic Information System (GIS) Modeling in Raster	3	Fall/2020
Take One of the Three Plans A, B or C Below (3 credits)		
Plan A: Project Report, CEGR795 Project Report (3)	3	Spring/2019
Plan B: Thesis, CEGR 797/799 Thesis Defense	3	N/A
Plan B: Courses only, **CEGR YYY**(3) CE electives	3	N/A
Total Credits for Each Option	**30**	

Note: One may take Plan A, B or C with a total of 30 credits.

1. Three CEGR XXX elective undergraduate courses will be replaced with CEGR 514, EEGR 505 and IEGR 512.
2. One has to take 3 CEGR TTTs as core courses from one of seven CEE tracks.
3. One may take two courses from a different track as a minor.
4. One can take up to one non-CEGR YYY elective with advisor's approval.
5. For Thesis Option one may be encouraged to take 6 credits hours of CEGR 790 & CEGR 791 as elective courses.

3.7 Maintaining Eligibility

Candidates in the B.S./M.E. Program are expected to maintain a high level of scholastic achievement. The above constitutes the minimum requirements for consideration for admission into the program. Admitted students must maintain a minimum GPA of 3.0 to remain in good standing as required by the School of Graduate Studies. Candidates who fall below the minimum cumulative grade point average of 3.0 for two consecutive semesters will be removed from the program. A student may decide to opt out of the B.S./M.E. program; however, they must complete all requirements for the traditional B.S. degree program. The B.S./M.E. program curriculum is designed such that candidates who successfully complete their coursework through the end of the senior year will automatically qualify them for completion of the B.S. degree requirements. Graduate courses successfully completed up to this time (6 credits or more), may be applied to the traditional graduate program. Once a candidate has opted out of the program, the candidate is no longer eligible for the B.S./M.E. program degree. In order to receive a Master's Degree at Morgan State University, the student will then have to apply to the traditional two-year M.E. program. Candidates who are removed from the program or otherwise opt out of the program are eligible to receive the traditional bachelor's degree in Civil Engineering (B.S.C.E), on completion of the requirements for the B.S. degree.

3.8 Degrees Received

Upon completion of 141 (111+30) credits, students receive both the Bachelor of Science and the Master of Engineering degrees. The Bachelor of Science (B.S.C.E) degree will be awarded from the Departments of Civil and Environmental Engineering and the M.E. degree will be awarded from the School of Graduate Studies.

A student may elect to receive only a B.S.C.E. degree, but must complete the requirements for the traditional B.S.C.E. degree program. In order to receive a Master's Degree in the School of Engineering at Morgan State University, the student will then have to apply to the traditional two-year program. **One in the 4+1 YR program CANNOT be awarded two degrees in the same semester.**

4 DOCTOR OF PHILOSOPHY (PH.D.) IN SUSTAINABLE AND RESILIENT INFRASTRUCTURE ENGINEERING (SRIE) WITH A PASS-THROUGH MASTER OF SCIENCE (M.S.) IN SRIE

4.1 Purpose

Morgan State University proposes a new academic graduate degree program, Doctor of Philosophy (Ph.D.) in Sustainable and Resilient Infrastructure Engineering (SRIE) with a pass-through Master of Science (M.S.) in SRIE. The Program builds upon the undergraduate courses offered within the CEE department and encompasses the research expertise/capabilities and graduate courses taught by the CEE faculty. The SRIE academic program focuses on current and emerging aspects of civil infrastructure design and management, with specific integration of sustainability and resilience assessment and analysis attributed to the research outcomes.

Students in the Ph.D. program study a combination of scientific and engineering principles to ensure the design, management, and innovation of sustainable, resilient infrastructure systems. Students enrolled in this program will acquire knowledge in a range of traditional civil and environmental engineering domains, as well as cross-disciplinary strategies, analytical tools, and research methods to optimize, plan, and manage critical infrastructure risks, while meeting sustainability standards.

4.2 Objectives

The Ph.D. program in Sustainable and Resilient Infrastructure Engineering (SRIE) targets highly motivated students who have already obtained a Bachelor's or Master's degree and desire to pursue career opportunities in academia, industry, federal and state agencies, NGOs, consulting engineering firms, or research. Upon completion of the Program, students will have gained a broad technical and interdisciplinary background that will enhance their ability to identify and tackle critical infrastructure, environmental, and natural resources challenges.

Specifically, upon completing the Program, students will be expected to:

- Demonstrate a breadth of knowledge in a chosen Sustainable and Resilient Infrastructure Engineering concentration;
- Apply advanced mathematics, theory, principles of engineering, planning, and/or management in solving complex civil infrastructure problems;
- Design independently and execute high-level research; and
- Communicate effectively both orally and in written form and function on an interdisciplinary team, particularly in a laboratory setting.

4.3 Admission

The Program welcomes exceptional students with at least a 3.3 cumulative GPA (on a scale of 4.0) for all graduate and undergraduate work completed and a commitment to innovation and leadership. Other requirements include a resume or curriculum vitae documenting current and previous professional activities, planned career goals, statement of research interest (not to exceed 500 words), and three letters of recommendation from professors or supervisors familiar with the applicant's academic/professional background. All application materials must be sent directly to the School of Graduate Studies for preliminary screening. Acceptance into the School of Graduate Studies is a prerequisite for admission into the Program.

4.4 General Requirements

Students enrolled in the Ph.D. Program is expected to:

1. Form a Ph.D. Advisory committee of four members, among whom at least three of them should be tenured or tenure-track faculty members. The chair of the committee must be a member of the graduate faculty and the CEE department. A minimum of three CEE faculty members must serve on the committee. The committee should be formed no later than the end of the third year of enrollment, that will approve the student's program of study and guide the student's research activities.
2. Complete a minimum of 36 graduate credit hours (including 15 hours of dissertation-related research) of study beyond the master's degree or complete a minimum of 60 graduate credit hours (including 15 hours of dissertation-related research) of study beyond the bachelors' degree.

3. Pass a written qualifying exam within the first two years of study, doctoral candidacy examinations, administered by the dissertation committee, on the core subjects and declared concentration.
4. Develop and defend a dissertation proposal within the first four years of admission; and
5. Complete and successfully defend a dissertation based on timely and original research in a relevant area of Sustainable and Resilient Infrastructure Engineering within the six years of matriculation.
6. The original contribution of the dissertation work must be determined by the dissertation committee chair.

To maintain good academic standing and remain in the Program, the student may not have course grades lower than B in any of the required core courses and must maintain a cumulative GPA of 3.5. Failure to meet these requirements will lead to academic probation for one academic year.

4.5 Residency Requirements

All candidates must satisfy eighteen (18) credit hours of residency requirements in one of the following ways: enrolling in nine credit hours per semester for two consecutive semesters or part-time candidates must register for six credit hours per semester for three consecutive semesters.

Upon achieving Ph.D. Candidacy, the student will continuously register in Fall and Spring terms for CEGR 997 (Dissertation Guidance) until the Dissertation is completed and submitted to the School of Graduate Studies for review. The course is used only when the curriculum has been completed, candidacy has been achieved, and the student is completing the research and writing of the Dissertation. The CEGR 997 course registration maintains the student status as a matriculated, full-time student (student is registered for 3 credit hours and the system reports a full-time 9 credit hour load). After the Intent to Defend the Dissertation form has been received by the School of Graduate Studies, this course registration will be changed to CEGR 998 (Dissertation Defense) for the given semester and count for 3 credit hours of curricular coursework (CEGR 998 will also count as 9 credits of load). CEGR 997 will not count toward curricular credits. Other courses cannot be substituted for CEGR 997 (Dissertation Guidance). The only eligible grade for CEGR 997 (Dissertation Guidance) is the grade of "S" and the only acceptable grade for CEGR 998 (Dissertation Defense) is "P/F" (Pass/Fail).

4.6 Program of Study

The program will utilize the courses currently available in the inventory of WebSIS at Morgan State University. Section 4.5 of this handbook gives all graduate-level civil engineering courses available in the inventory at Morgan State University, together with the course descriptions. The required minimum coursework for the Ph.D. in Sustainable and Resilient Infrastructure Engineering is 60 equivalent credit-hours beyond the bachelor's degree (Table 3) and 36 equivalent credit-hours beyond the masters' degree (Table 4). The graduate courses comprised of: (1) Foundation Courses (each credit is equivalent to 1 credit-hour of graduate coursework) of which students may study within a concentration and be advised of core courses to take; (2) Elective Courses (each credit is equivalent to 1 credit-hour of graduate coursework); (3) Research Area Courses where each credit is equivalent to 3 credit-hours of graduate coursework; (4) Graduate Seminar, and (5) Dissertation Research.

Table 3: Credit breakdown for students pursuing a Ph.D. directly from bachelor's Degree (60 credits required beyond a bachelor's Degree).

Foundation Elective Courses (8)	24 credits*
Research courses (5)	15 credits
Graduate Seminar (1)	3 credits
Dissertation Research (5)	15 credits
Dissertation Defense (1)	3 credits
Total	**60 credits**

Note: At least three foundation elective courses from the same track are required for a concentration in SRIE

Table 4: Credit breakdown for students pursuing a Ph.D. Degree directly from Master's Degree (36 credits required beyond a Master's Degree).

Foundation Elective Courses (3)	9 credits *
Research Courses (2)	6 credits
Graduate Seminar (1)	3 credits
Dissertation Research (5)	15 credits
Dissertation Defense (1)	3 credits
Total	**36 credits**

From Table 4, students with a master's degree in the approved areas listed in Table 5 will be required to take a minimum of 36 equivalent graduate credit hours, including: 9 credits of Elective Courses, 6 credits of Research Courses, 3 credits of Graduate Seminar, 15 credits of Dissertation Research, and 3 credits of Dissertation Defense.

Table 5: List of approved Master's Degree programs for admission to the Ph.D. program

Masters in Engineering
Masters of Science in Civil Engineering
Masters of Science in Environmental Engineering

Students who have a Master's degree, but not in one of the approved degree programs listed in the Table 5 will need to be reviewed and granted approval from the CEE Graduate Faculty committee and Graduate Program Director in order to take the 36-credit option. Prospective students should seek guidance about the approval of Master's degrees from the Graduate Program Director during the application process.

Table 6: Research Courses

Course Number	Course Title	Credits
CEGR 805	Pre-Candidacy Research I	3.0
CEGR 810	Pre-Candidacy Research II	3.0
CEGR 815	Pre-Candidacy Research III	3.0
CEGR 820	Pre-Candidacy Research IV	3.0
CEGR 825	Pre-Candidacy Research V	3.0

Table 7: Dissertation Research Courses

Course Number	Course Title	Credits
CEGR 905	Dissertation Research I	3.0
CEGR 910	Dissertation Research II	3.0
CEGR 915	Dissertation Research III	3.0
CEGR 920	Dissertation Research IV	3.0
CEGR 925	Dissertation Research V	3.0
CEGR 997/998	Dissertation Guidance/Defense	3.0

Note that the student is eligible to take the Dissertation Research courses listed in Table 7 ONLY after he/she has passed the Dissertation Proposal Exam (A) and has been 'Advanced to Candidacy'. Prior to this the Research courses in Table 6 must be used. A student who has completed all required course credits, but who has not 'Advanced to Candidacy', should register for the CEGR 993 (Pre-Candidacy course). Ph.D. students are expected to complete at least three articles for publication, of which one is either accepted or published in a journal (approved by the Ph.D. committee) and two are submitted as peer-reviewed journal papers guided by the advisor before completion of their program, and they will finish the Ph.D. program with CEGR 997/998 (Dissertation Guidance/Defense).

4.7 Notice of Intention

Students who have completed at least 12 semester hours, and have attained a cumulative grade at least above 3.5, may file notice of intention to become a candidate for Ph.D. with the Department of Civil and Environmental Engineering If a student already enrolled as a candidate for the Master's degree wishes to file notice to become a candidate for Ph.D., the student must reapply. The notice of intention must include a plan of study with a concentrated area and approved by the Advisory

Committee. At least three of them should be tenured or tenure-track faculty members. The chair of the committee must be a member of the graduate faculty and the CEE department. At least three committee members are required to be from the Department of Civil and Environmental Engineering. One committee member must be from outside of the Department of Civil and Environmental Engineering

Notice of Intention for Ph.D. Candidate

Department of Civil and Environmental Engineering

Name:			
	First	**MI**	**Last**
Address			
Student ID #		**Phone**	
Email			
Dissertation Title			

EXAM COMMITTEE: Minimum of four voting members required where at least three (3) are members of the Department of Civil and Environmental Engineering faculty (regular, affiliate, adjunct, research or emeritus assistant or associate professors), three of whom must be tenured or tenure-track faculty members, and one committee member must be from outside of the Department of Civil and Environmental Engineering.

Date of Exam/ Location		
	Name	**Signature**
Chair		
Committee Member		
Committee Member		
Committee Member		
Committee Member		
External non Civil Faculty Member		
External non Civil Faculty Member		
Department Chair's Approval		

Note:

Are you registered in the term in which you defend? Yes ☐ No ☐
Have you completed at least 12 semester hours in the term in which you defend? Yes ☐ No ☐
Have you attained a cumulative grade point at least above 3.5 Yes ☐ No ☐
Have you turned in your dissertation proposal 3 weeks prior to the exam? Yes ☐ No ☐
Have you attached the following documents in PDF format?

I. Current CV of your external committee member Yes ☐ No ☐
II. Copy of your current CV

4.8 Two Tracks Within the Ph. D. Program

Track 1: The minimum requirement for a Ph.D. Degree is 36 credit hours beyond a Master's Degree. This includes 3 credit hours for the Dissertation Defense (CEGR 998), 3 credit hours for Seminar (CEGR 787), 9 credit hours of Foundation Electives, 6 credit hours of Research Courses (CEGR 805 and CEGR 810) with Research Advisor's approval, and 15 credit hours of Dissertation Research.

Of the 36 credits, the graduate credit hours must be at the 500-600 level and above, with a maximum of 9 credits allowed at the 500 level. The 3 credit hours of Dissertation Defense (CEGR 998) is awarded on completion of the Candidate's Dissertation. After Advancement to Candidacy, the candidate will continue to enroll in the Dissertation Guidance (CEGR 997) every semester until completion of the dissertation requirements. Graduate credits at the 500-600 equivalent level or higher may be accepted for transfer from a regionally accredited institution for Ph.D. students. The maximum number of credits will be determined by the program in which the student is enrolled.

Track 2: The minimum requirement for the Ph.D. Degree is 60 credit hours beyond a Bachelor's Degree. This includes 3 credit hours for the Dissertation Defense (CEGR 998), 3 credit hours for Seminar (CEGR 787), 24 credit hours of Foundation Electives, of which up to 6 credits can be replaced by non-CEGR YYYs with advisors' approval, 15 credit hours of Research Courses (CEGR 805 – CEGR 825) with Research Advisor's approval, and 15 credit hours of Dissertation Research. This requirement may, however, be increased at the discretion of the student's advisory committee.

After successful completion of all (30) credits the student is awarded the en Passant Master's degree.

Of the 60 credits, a maximum of 24 credits can be at the 500 level; and the remaining 36 credits must be at the 600 level and above. The 3 credit hours of Dissertation Defense (CEGR 998) is awarded on completion of the Candidate's Dissertation. After Advancement to Candidacy, the candidate will continue to enroll in the Dissertation Guidance (CEGR 997) every semester until completion of the dissertation requirements. Graduate credits at the 500-600 equivalent level or higher may be accepted for transfer from a regionally accredited institution for Ph.D. students. The maximum number of credits will be determined by the program in which the student is enrolled.

4.9 Study Plan

To assure that students plan their work properly with appropriate advice from the faculty, every student enrolled in the graduate program is required to fill Ph.D. Study Plan Form. Not every course is offered every term. At the initial conference with an advisor, an initial plan of study will be established, and submits it when registering for first semester courses to the graduate program coordinator of civil engineering and the department office for placement in the student's official file. At this time, any anticipated exceptions or anticipated transfer credits will be noted. This plan must be updated every semester. The plan must be approved by the student's faculty adviser before a copy is submitted to the graduate program coordinator of civil engineering and the department office.

Below are two examples of a plan of study for a Ph.D. in SRIE

***Plan I**: For students with a master's degree pursuing a Ph.D. in SRIE (36 credits)*

		First Semester	Credits		Second Semester	Credits
YEAR 1	CEGR 787	GRADUATE SEMINAR	3	CEGR xxx	FOUNDATION ELECTIVE *or* RESEARCH COURSE	3
	CEGR xxx	FOUNDATION ELECTIVE *or* RESEARCH COURSE	3	CEGR 805	RESEARCH COURSE	3
					SUBMIT PAPER # 1	
	CEGR xxx	FOUNDATION ELECTIVE *or* RESEARCH COURSE	3	CEGR 810	RESEARCH COURSE	3
		TAKE QUALIFYING EXAM (earliest)			***CANDIDACY PROPOSAL EXAM (A)***	
	TOTAL		**9**	**TOTAL**		**9**
YEAR 2	CEGR 905	DISSERTATION RESEARCH	3	CEGR 920	DISSERTATION RESEARCH	3
	CEGR 910	DISSERTATION RESEARCH	3	CEGR 925	DISSERTATION RESEARCH	3
	CEGR 915	DISSERTATION RESEARCH	3		*SUBMIT PAPER # 3*	
		SUBMIT PAPER # 2				
	TOTAL		**9**	**TOTAL**		**6**
YEAR 3	CEGR 997/998	DISSERTATION GUIDANCE/DEFENSE	3 / 9			
		DISSERTATION DEFENSE EXAM (B)				
		COMPLETE & SUBMIT DISSERTATION				
	TOTAL		**3**			
		MS->PhD, ENGINEERING			**TOTAL CREDIT HOURS**	**36**

Table 8: A 36-credit plan for students with an approved Master's degree pursuing a Ph.D. in SRIE

First Semester (9 Credits)

- Graduate Seminar 3 credits
- Foundation Elective/Research Course 6 credits
- *Take Qualifying Exam (Q Exam)**

Second Semester (9 Credits)

- Foundation Elective/Research Course 3 credits
- Research Course 6 credits
- *Take Candidacy Proposal Exam A**

Third Semester (9 Credits)

- Dissertation Research 9 credits

Fourth Semester (6 Credits)

- Dissertation Research 6 credits

Fifth Semester (3 Credits)

- Dissertation Guidance/Defense 3 credits
- *Take Dissertation Defense Exam B*

Total Credits = 36

***Plan II**: For students holding only a bachelor's degree pursuing a Ph.D. in SRIE (60 credits)*

		First Semester	Credits		Second Semester	Credits
YEAR 1	CEGR 787	GRADUATE SEMINAR	3	CEGR 805	RESEARCH COURSE	3
	CEGR xxx	FOUNDATION ELECTIVE COURSE	3	CEGR xxx	FOUNDATION ELECTIVE COURSE	3
	CEGR xxx	FOUNDATION ELECTIVE COURSE	3	CEGR xxx	FOUNDATION ELECTIVE COURSE	3
	TOTAL		**9**	**TOTAL**		**9**
YEAR 2	CEGR xxx	FOUNDATION ELECTIVE COURSE	3	CEGR xxx	FOUNDATION ELECTIVE COURSE	3
	CEGR xxx	FOUNDATION ELECTIVE COURSE	3	CEGR xxx	FOUNDATION ELECTIVE COURSE	3
	CEGR 810	RESEARCH COURSE	3	CEGR 815	RESEARCH COURSE	3
		TAKE QUALIFYING EXAM				
	TOTAL		**9**	**TOTAL**		**9**
		After Successful completion of all credits the student is awarded the en Passant Master's degree				
YEAR 3	CEGR 820	RESEARCH COURSE	3	CEGR 910	DISSERTATION RESEARCH	3
	CEGR 825	RESEARCH COURSE	3	CEGR 915	DISSERTATION RESEARCH	3
	CEGR 905	DISSERTATION RESEARCH	3	CEGR 920	DISSERTATION RESEARCH	3
		SUBMIT PAPER # 1			*SUBMIT PAPER # 2*	
		CANDIDACY PROPOSAL EXAM (A)				
	TOTAL		**9**	**TOTAL**		**9**
YEAR 4	CEGR 925	DISSERTATION RESEARCH	3	CEGR 997/998	DISSERTATION GUIDANCE/DEFENSE	3 / 9
	CEGR 997	DISSERTATION GUIDANCE/DEFENSE	0/6		***DISSERTATION DEFENSE EXAM (B)***	
		SUBMIT PAPER # 3			COMPLETE & SUBMIT DISSERTATION	
	TOTAL		**3**	**TOTAL**		**3**
		BS –> PhD, SRIE			**TOTAL CREDIT HOURS**	**60**

Table 9: A 60-credit plan for students with a bachelor's degree pursuing a Ph.D. in SRIE

First Semester (9 Credits)

- Graduate Seminar 3 credits
- Foundation Elective Course 6 credits

Second Semester (9 Credits)

- Foundation Elective Course 6 credits
- Research Course 3 credits

Third Semester (9 Credits)

- Foundation Elective Course 6 credits
- Research Course 3 credits
- *Take Qualifying Exam (Q Exam)*

Fourth Semester (9 Credits)

- Foundation Elective Course 6 credits
- Research Courses 3 credits

Fifth Semester (9 Credits)

- Research Courses 6 credits
- Dissertation Research 3 credits
- *Take Candidacy Exam (A Exam)*

Sixth Semester (9 Credits)

- Dissertation Research 9 credits

Seventh Semester (3 Credits)

- Dissertation Research 3 credits

Eighth Semester (3 credits)

- Dissertation Defense/Guidance (B Exam)3 credits

Total Credits = 60

4.10 Admission to Ph.D. Candidacy

The Ph.D. student has the right to assemble his/her own Advisory Committee as well as selecting the major advisor. The committee and the student constitute an independent working unit. This committee, along with the major advisor who serves as the Chair of the committee, guides the student, determines his/her doctoral course work, and sets specific requirements to be followed in order for the student to obtain his/her degree. Students are recommended for a degree when the Committee members agree that an appropriate level of scholarly achievement has been reached in the area of study and that the Ph.D. requirements have been satisfied. This committee will consist of four voting members required, among whom at least three (3) are members of the Department of Civil and Environmental Engineering extended faculty (regular, affiliate, adjunct, research or emeritus assistant or associate professors). **At least three of them should be tenured or tenure-track faculty members. The chair of the committee must be a member of the graduate faculty and the CEE department**, and one committee member must be from outside of the Department of Civil and Environmental Engineering. The graduate student must submit a 'Notice of Intention for Committee' form. Committee appointments are subject to the approval of the Committee Chair. This committee must be formed before the student can take the Qualifying Examination and (A) Examination. No member on the Advisory committee can be changed by the student once the (A) examination has been completed.

4.11 Examinations

The Ph.D. student is required to take three examinations: Qualifying examination, the Admission to Candidacy (A) examination, and the Dissertation Defense (B) examination. A Qualifying Examination is written and must be passed before taking Examination (A). The Admission to Candidacy examination can be written, oral, or both written and oral. The Dissertation Defense is oral. The examinations are to be taken in the following manner:

Qualifying Examination (Q-Exam): Ph.D. students are required to take a written Qualifying Examination within the first two years of study. The qualifying examination is to demonstrate technical competence based on core coursework within the selected concentration area. This examination is typically completed in the first three or four regular semesters of registration. The qualifying examination is an open book exam, given by the CEE members of the Advisory Committee and administered by the Committee Chair. It is offered in both Spring and Fall semesters.

Admission to Candidacy Examination (Examination-A): An admission to candidacy examination will be conducted to judge the candidate's comprehension of graduate coursework and the candidate's ability to present and defend the results of independent research. The Ph.D. candidacy examinations should be taken no later than one year after passing the Qualifying Examination. During the oral Examination-A, the committee members may ask questions related to written qualifying exams and topics beyond the written exam within the disciplinary area. At the time of this examination, the student must make a presentation of his/her proposed research, which presents the underlying engineering technologies and outlines the plan of research. Any deficiencies that may be uncovered during the written exam must be rectified before a candidate can be permitted to take this examination.

This exam is to be conducted by the full Ph.D. Advisory Committee. See appendixes A1, A2, A3 and A4 for forms on the Admission to Candidacy (A) examination. Should the student fail this Candidacy Examination, the Ph.D. Advisory Committee determines the conditions to be met before a second examination is to be administered. A third examination is prohibited.

Dissertation Defense (Examination-B): All Ph.D. candidates are to conduct a major research project, the result of which culminates in a dissertation. This dissertation must be a well-reasoned application of advanced knowledge of technology and must show evidence of scholarly attainment in the student's major specialty. The Ph.D. Advisory Committee will conduct the dissertation defense examination. This examination will determine the candidate's ability to apply advanced engineering disciplines to problems of substance in a creative and scholarly manner. Prior to the time of the Examination-B, Ph.D. students are expected to complete at least three articles for publication, of which one is either accepted or published in a journal (approved by the doctoral Ph.D. committee) and two are submitted as a journal paper before completion of their program. Any deficiencies that may have been uncovered in pervious examinations must have been rectified before a candidate can be permitted to take his dissertation examination.

At least 45 days prior to the intended date of the (B) examination, a notification of the intent to schedule this Examination must be submitted to the appropriate engineering department. This notification will include a complete preliminary copy of the dissertation written to satisfy the graduate school's requirements for content and format, and approved by the Major Advisor. A request for Dissertation Defense Examination signed by the candidate and the Major Advisor must be submitted along with Dissertation approval sheet no later than two weeks prior to the scheduled final examination. A final draft copy of the dissertation, written to satisfy the graduate school's requirements for content and format, will be delivered to each member of the Ph.D. Advisory Committee at least 10 business working days prior to the examination.

The Dissertation Defense will include a publicly announced presentation of the dissertation where faculty and students will be free to question the research. A separate closed session with the full Ph.D. Advisory Committee will follow which may include any additional queries on the research or related engineering principles. If a candidate does not pass the (B) examination unconditionally, upon consensus of the Ph.D. Advisory Committee members, the chairperson of the committee will give the Ph.D. candidate written recommendations for completion of dissertation requirements.

4.12 Other Miscellaneous Considerations

If a Ph.D. candidate goes to industry or government while completing his/her research, an Understanding of Agreement must be drawn up between the company, advisor, and advisee. This agreement outlines the goals and expectations concerning the overview and completion of the research dissertation before the advisee leaves. All work will continue to be conducted under the guidance and approval of the Major Advisor in absentia.

4.13 Transfer Credit

See Section 2.13

Ph.D. Study Plan Form (for a MS/ME degree holder) in Department of Civil and Environmental Engineering

Name:			
	First	**MI**	**Last**
Address			
Student ID #		**Phone**	
Email			
Degree Program			
Faculty Advisor			
Faculty Advisor's Signature		**Date**	

COURSE NAME	**CREDITS**	**SEMESTER/YEAR**
Three CE Courses (9) and One Graduate Seminar (3)		
CEGR XXX	3	/
CEGR XXX	3	/
CEGR XXX	3	/
CEGR 787	3	/
Two CE Research Courses (6 credits)		
CEGR 805	3	/
CEGR 810	3	/
Five CE Dissertation Research Courses (15 credits)		
CEGR 905	3	/
CEGR 910	3	/
CEGR 915	3	/
CEGR 920	3	/
CEGR 925	3	/
Dissertation Defense (3 credits)		
CEGR 997/CEGR 998(3)	3	/
Total Credits	**36**	

Note:

1. 9 credit hours of 3 CE core courses for one concentration area (i.e., CEGR XXX electives at 600 level above).
2. 3 Credit for Graduate Seminar (CEGR 787)
3. 6 credit hours of CEGR 805 and CEGR 810 for research in CE are required.
4. 15 credit Dissertation Research courses CEGR 9xx is required.
5. 3 credit hours of Dissertation Defense, Dissertation candidates only sign up for CEGR 997 courses after candidacy. If the dissertation is approved by the School of Graduate Studies when submitted, the School of Graduate Studies will convert the candidate to the appropriate CEGR 998 course as directed by the Program Director.

Ph.D. Study Plan Form (for a BS degree holder)
in Department of Civil and Environmental Engineering

Name:	First	MI	Last
Address			
Student ID #		Phone	
Email			
Degree Program			
Faculty Advisor			
Faculty Advisor's Signature		Date	

COURSE NAME	CREDITS	SEMESTER/YEAR
Eight Courses (24 credits) and One Seminar Course (3)		
CEGR XXX	3	/
CEGR XXX	3	/
CEGR XXX	3	/
CEGR XXX	3	/
CEGR XXX	3	/
CEGR XXX	3	/
CEGR XXX	3	/
CEGR XXX	3	/
CEGR 787	3	/
Five CE Research Courses (15 credits)		
CEGR 805	3	/
CEGR 810	3	/
CEGR 815	3	/
CEGR 820	3	/
CEGR 825	3	/
Five CE Dissertation Research Courses (15 credits)		
CEGR 905	3	/
CEGR 910	3	/
CEGR 915	3	/
CEGR 920	3	/
CEGR 925	3	/
Dissertation Defense (3 credits)		
CEGR 997/CEGR 998	3	/
Total Credits	60	

Note:

1. 24 credit hours of 8 CE major required courses (i.e., CEGR XXXs), of which up to 6 credits can be replaced by non-CEGR YYYs with Advisor's approval
2. 3 credit hours for Graduate Seminar (CEGR 787)
3. 15 credit hours of CEGR 8xx for research in CE are required.
4. 15 credit hours of CEGR 9xx for Dissertation Research are required.
5. 3 credit hours of Dissertation Defense, Dissertation candidates only sign up for CEGR 997 courses after candidacy. If the dissertation is approved by the School of Graduate Studies when submitted, the School of Graduate Studies will convert the candidate to the appropriate CEGR 998 course as directed by the Program Director.

APPENDIX A: FORMS

MORGAN STATE UNIVERSITY
THE SCHOOL OF GRADUATE STUDIES
School of Engineering

A1. ADMISSION TO DOCTORATE CANDIDACY: (A) EXAMINATION

Student: _____Soc. Sec. #:_____

Curriculum/Dept:

Committee Chairperson:

Committee Member:

Dissertation Title:

Date:

Please, place an X on the appropriate box and affix your signature and date.

☐ **Candidacy (A) Examination Completed and Recommend for Approval.**

☐ **Candidacy (A) Examination Completed and Recommend for Approval with suggested modification(s) and /or addition(s) specified on the evaluation page.**

☐ **Unsatisfactory Candidacy (A) Examination: Recommend for 2nd Candidacy Examination within _____ Months with suggested modification(s) and/or addition(s) specified on the evaluation page.**

_____ _____

Committee Member's Signature **Date**

DIRECTIONS:

1. **EVALUTION PAGE MUST BE COMPLETED BEFORE COMPLETEING THIS EXAMINATION PAGE.**
2. **THESE DATA AS GIVEN ABOVE BECOME PART OF THE STUDENT RECORDS MAINTAINED BY THE APPROPRIATE DEPARTMENT OF DOCTORATE ADVISORY COMMITTEE CHAIRPERSON.**
3. **MEMBERS OF THE FACULTY MUST BE FULLTIME FACULTY TO SERVE ON DOCTORATE COMMITTEES**

A2. EVALUATION
ADMISSION TO DOCTORATE CANDIDACY: (A) EXAMINATION

Student: Curriculum:

Each committee member should rate the research proposal using this rate sheet.

RATING FACTORS

FACTORS	**MAXIMUM SCORES**	**RATER SCORES**
(1) Significance of Topic		
a. Application Point of View	**10**	
b. Research Point of View	**10**	
(2) Clarity of Objective(s)	**10**	
(3) Personal Contribution*	**10**	
(4) Completeness of the Proposal		
a. Adequate Literature Reviewed	**10**	
b. Distinctive Procedure	**10**	
c. Data Collection / Development	**10**	
d. Potentiality of Completion	**10**	
5. Relationship to Civil Engineering	**10**	

6. Overall Professionalism	**10**	
Total Score	**100**	

* Beside intellectual ability, personal contribution includes student's ability to apply scientific and engineering knowledge to the development of his/her proposal for dissertation and research.

A3. SUGGESTION

Student: _____ Curriculum:

1. ***Committee members should provide any suggestion for development, modification and/or addition for completeness of the proposed research.***
2. ***If retaking this examination is recommended, the area(s) of deficiency <u>MUST</u> be specified and discussed in this section.***
3. ***Please, attach extra pages if needed.***

MORGAN STATE UNIVERSITY
THE SCHOOL OF GRADUATE STUDIES
School of Engineering

A4. NOMINATION OF SPECIAL COMMITTEE
AND ADVISOR CHAIRPERSON

Original Form____ Amended Form for addition to _____ or change of special committee

NAME_____ DATE_

Last First Middle

DEGREE PROGRAM_____ FIELD_____

(If noncandidate, indicate here)

_____representing

Chairperson major subject track

_____representing

Member minor subject track

_____representing

Member minor subject track

_____

Additional member

_____

Field-appointed member with mailing address

(If required)

Print Names, Signatures, and Date:

_____

DIRECTIONS

THESE DATA AS GIVEN ABOVE BECOME PART OF THE PERMANENT RECORDS MAINTAINED BY THE SCHOOL OF GRADUATE STUDIES. MEMBERS OF THE FACULTY MUST BE FULLTIME FACULTY TO SERVE ON SPECIAL COMMITTEES. AT LEAST 3 COMMITTEE MEMBERS ARE REQUIRED TO BE FROM DEPATMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING.

A5. TRANSFER GRADUATE COURSE EQUIVALENCY FORM

Last Name First Name M.I. Student ID .

Email Address Cell Phone .

Fall **Spring** **Summer** **Other** **Year**

Dates of attendance for the graduate program: From To
Month/day/year Month/day/year

Host Institution Course # & Title	Credit Hours	Proposed MSU Equivalent Course # & Title	Credit Hours	Decision (Yes/No)

Additional Comments:

Departmental Evaluator & Graduate Program Director:
Signature/Date .

Chair of Department:
Signatures/Date .

SOE Associate Dean:
Signature/Date .

Graduate School;
Signature/Date .

Instructions for Course Equivalency Form

1. To students: Collect and attached a copy of your transcript. Pick up the Course Equivalency Form from the Department Office and schedule an appointment with your academic advisor or graduate program director to finalize course equivalency and credits. Attach all course materials with you to your appointment (course description, syllabus, reading list, completed work etc.) Only course work with a grade B or above can be transferred.

2. To departmental graduate program director: Require a copy of the transcript along with the original course equivalency form. Compare MSU's proposed courses in the form with the student's transcript course work from the host institution to determine MSU course equivalency.

APPENDIX B. COURSE DESCRIPTIONS

CEGR 510: Principles of Environmental Engineering I
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Covers the domains and principles of environmental engineering. This course provides context for advanced understanding of environmentally regulated systems. Review of the interdisciplinary sciences (biological, ecological, physical, and chemical) will focus on transformation processes, transport phenomena, and reactor models for water quality engineering applications and technologies.

CEGR 511: Principles of Environmental Engineering II
Three Hours: 3 Credits
Prerequisites: CEGR 510 or Instructor Approval
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
A continuation of CEGR 510 and covers topics such as advanced water and wastewater treatment, air quality engineering, integrated solid waste management, hazardous waste management, site assessment, remediation technologies, and environmental health and safety.

CEGR 512: Principles of Environmental Engineering III
Three Hours: 3 Credits
Prerequisites: CEGR 511 or Instructor Approval
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
The course covers basic concepts in environmental engineering design not covered in CEGR 510 and CEGR 511 and covering topics such as urban sustainable systems, bioremediation, and environmental modeling and simulation (water, groundwater, stormwater, and air).

CEGR 513: Environmental Chemistry and Microbiology
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Chemical laboratory work includes analyses of turgidity, color, pH, acidity, alkalinity, and hardness, etc.; and instrumental methods using high pressure liquid chromatography, gas chromatography, and atomic absorption, etc. The microbiological analyses include uses and functions of the microscope, multiple- tube and membrane filter techniques. The laboratory analyses are covered independently from the lecture. The lecture covers combustion chemistry, chemistry of the anaerobic process, and atmospheric chemistry.

CEGR 514: Environmental Impact and Risk Assessment
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed
The course covers strategies and methodologies that have been used to assess the impact of engineering projects. These include technology to assess the impact on air, surface water, and ground water quality, and on land use of transportation facilities, water supply and pollution control facilities, and industrial and community development.

CEGR 531: Reliability Analysis for Infrastructure and Environmental Systems
Three Hours: 3 Credits
Prerequisites: Departmental Approval
Co-requisites: None

Term(s) offered: Fall or Spring or as needed.
Systems reliability and reliability analysis. Includes measures of reliability, reliability index, correlation coefficient, influence, reliability bounds, Point Estimate Method, Monte Carlo Simulation and others.

CEGR 533: Matrix Structural Analysis
Three Hours: 3 Credits
Prerequisites: Structural Analysis
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Review of statically determinate and indeterminate structures. Degrees of freedom of a structure. Force-Displacement relations for axial load, shear force and bending moment. Euler-Bernoulli beam element. Analytical basis for Force and Displacement Methods of Structural Analysis. Introduction to the Stiffness Method for structural systems. Application of Stiffness Method for trusses, beams and frames. Stepwise development of a computer program to compute nodal displacements and member forces.

CEGR 590 Smart Material Systems
Three Hours: 3 Credits
Prerequisites: Mechanics of Materials and Departmental Approval
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
An introduction to the principles and applications of various sensor, actuator and functionality of smart materials and structures in order to monitor their state of health, automatically heal internal fractures and adapt to environmental changes to reduce maintenance cost and increase life span. Constitutive modeling of piezoelectric materials, electroactive polymers, shape memory alloys, and system modeling for the analysis, design, and control of smart material systems.

CEGR 610: Stormwater Management
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course covers fundamental concepts of stormwater management. The class is provided on the engineering and regulatory aspects of stormwater management to address quality and quantity, receiving water problems and sources of pollutants, selection and design of controls and regulations. This course focuses on the proper design, construction and maintenance of various stormwater BMPs, a number of actual constructed systems to support their feasibility and applicability in different development settings.

CEGR 611: Hydrologic Modeling
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course is an introduction to simulation modeling of river analysis systems and stormwater management models. The river analysis system will cover flood areas, embankment and protection work design, river restoration, emergency plans for dam break, optimization of hydraulic work and risk assessment and management. The stormwater management model will cover planning, analysis, and design related to stormwater runoff, combined and sanitary sewers, and other drainage systems.

CEGR 612: Stormwater Modeling
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
The class will discuss functionality, accessibility, characteristics and components in the quantity analysis of the hydrological design models. It will cover the basic theories of hydrologic modeling concepts. This course includes computing requirements, data preparation, boundary conditions, model components, model

verification, model optimization, forecasting streamflow, depth-area reduction, assessing model uncertainty, erosion and sediment transport, and water quality.

CEGR 613: Physical-Chemical Treatment of Waste and Wastewater I
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course covers topics in physical-chemical treatment of water and wastewater and advanced topics in unit operations, flow measurements and water quality equalization; pumping; screening, settling, and flotation; mixing and flocculation; filtration and aeration, absorption, and stripping.

CEGR 614: Physical-Chemical Treatment of Waste and Wastewater II
Three Hours: 3 Credits
Prerequisites: CEGR 613
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course covers areas of the physical-chemical treatment of water and wastewater not covered in CEGR 613 and includes the unit operations of carbon absorption and membrane processes and the unit processes of water softening and removal of nitrogen and phosphorous, fluoridation and defluoridation, iron exchange, and disinfection.

CEGR 615: Open Channel Hydraulics
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course covers basic principles and energy and momentum equations, uniform flow, gradually varied flow, and spatially and rapidly varied flow. A software project will be required for submission at the end of the course.

CEGR 616: Biochemical Processes in Environmental Engineering
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course covers the basic fundamental principles of biochemical processes in environmental engineering systems. Basic concepts in biochemical processes, qualitative tools for describing stoichiometry and energetics of biochemical reactions; qualitative tools for enzymatic kinetics and the principle of mass balance in the analysis of biochemical reactors are presented.

CEGR 617: Advanced Biochemical Processes in Environmental Engineering
Three Hours: 3 Credits
Prerequisites: None
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This is an advanced course in biochemical process engineering application in environmental quality control. It covers in depth application of the principles of biochemical system in the treatment of water, wastewater and biodegradation of hazardous chemicals in the environment.

CEGR 619: Modeling of Groundwater Flow
Three Hours: 3 Credits
Prerequisites: Groundwater hydrology, FORTRAN Programming and MATH(PDE) applications.
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.

Numerical solutions of the groundwater flow equations (Partial Differential Equations). Emphasis on learning methodology and the use of groundwater flow models such as MODFLOW, FLOW PATH AND SEETRAN.

CEGR 620: Modeling of Groundwater Pollutant Transport
Three Hours: 3 Credits
Prerequisites: **Groundwater hydrology, FORTRAN Programming and Math (PDE) applications.**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Numerical and analytical solutions of the advection dispersion equation. Emphasis on learning methodology and the use of groundwater models in contaminant and transport such as MT3D, RT3D and MODFLOW.

CEGR 623: Hydrodynamics
Three Hours: 3 Credits
Prerequisites: **Groundwater Hydrology, Fluid Mechanics and Math (PDE) applications.**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course covers fundamental concepts of dynamics of surface water flow, analysis and characteristics of flow in open channels, flow and channel design with consideration of various types of flow, methods and application of flow measuring devices, and problem solving.

CEGR 624: Hydrostatistics
Three Hours: 3 Credits
Prerequisites: **Hydrology and Math (probability and statistics).**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Introduction to hydrostatistical data estimation using the concepts of variograms, multivariate techniques, correlation analysis, and linear multiple linear regression. Introduction to some stochastic hydrologic models.

CEGR 625: Modeling of Surface Water
Three Hours: 3 Credits
Prerequisites: **Hydrology, FORTRAN programming and Math (ODE and PDE).**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course emphasizes fundamental concepts and theory and methods of modeling surface water flow, establishment of conceptual, physical, mechanical, mathematical models and applications of analytical and numerical solutions to solving engineering problems related to environmental issues.

CEGR 626: Surface Water Hydrology
Three Hours: 3 Credits
Prerequisites: **Fluid Mechanics and Math (PD and ODE).**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course emphasizes fundamental concepts of surface water hydrology and physical processes in surface and shallow subsurface water. Through exercises and problem sets, the course introduces students to practical techniques utilized in applied surface water hydrology.

CEGR 627: Introduction to Multiphase Flow
Three Hours: 3 Credits
Prerequisites: **Continuum Mechanics, Advanced Groundwater Hydrology and Math (PDE)**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course emphasizes fundamental concepts of theory of multiphase flow including physical processes within multiphase flow, conservation of mass, energy and momentum, constitutive relations of multi- phase flow and analytical solutions for problems related to multiphase flow through porous media.

CEGR 628: Bridge Engineering
Three Hours: 3 Credits
Prerequisites: **Design of Steel and Reinforced Concrete Structures**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Historical development of the modern highway bridge; materials; loads and the load path; reinforced concrete bridges; slab, T-Beam and box girders; slab-steel beam bridges, non-composite vs. composite sections; design of continuous steel beam bridges; plate girder bridges; pre-stressed concrete bridges; serviceability; inspection, maintenance and rehabilitation of highway bridges; bridge aesthetics.

CEGR 629: Advanced Structural Steel
Three Hours: 3 Credits
Prerequisites: **Design of Steel Structures**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Advanced design of structural steel elements according to the AISC Load and Resistance Factor Method as applied to advanced topics in steel design. Topics include composite floor systems; bolted and welded connections; beam-column connections; base plates, conventional and innovative lateral load resisting systems for seismic loading as well as application of high strength steel and designing of hybrid steel sections.

CEGR 630: Finite Element Analysis
Three Hours: 3 Credits
Prerequisites: **Structural Analysis, Matrix Structural Analysis, and Instructor Approval**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Approximation techniques; Introduction to the Finite Element Method; weighing functions; Galerkin formulation; 1-d and 2-d finite elements; coordinate systems; field problems-irrotational flow, heat transfer; structural and solid mechanics, axial force member, theory of elasticity; linear and quadratic elements, element shape functions; isoparametric elements; Software platform ANSYS 5.3.

CEGR 631: Structural Dynamics
Three Hours: 3 Credits
Prerequisites: **Matrix Structural Analysis and Dynamics and Instructor Approval**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Free and forced vibrations of damped and undamped, single-degree-of-freedom and multidegree-of-freedom systems. Langrange's equations; transient and steady-state vibrations; eigenvalue analysis for natural frequencies and normal modes; analysis and stability of structural components (including beams, cables and large systems inshore, offshore, and in space). Time-domain vs. frequency domain analysis; classical approximate methods, Rayleigh method, Dunkerley's equation, Rayleigh Ritz Method, Myklestad's Method for beams; introduction to random vibrations.

CEGR 634: Prestressed Concrete Design
Three Hours: 3 Credits
Prerequisites: **Design of Reinforced Concrete Structures and Instructor Approval**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Study of prestressing methods (Pre-tensioning and post-tensioning techniques) including strength and load-balancing approaches and their application to the analysis and design of beams, slabs, and axially loaded members. The course discusses properties of concrete and prestressing steels and topics include PCI and ACI design criteria. Anchorage-zone analysis and design for flexure, shear, torsion, camber and study of deflection and time-dependent losses

CEGR 635: Advanced Reinforced Concrete Design

Three Hours: 3 Credits
Prerequisites: **Design of Reinforced Concrete Structures and Instructor Approval**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course utilizes the mechanics of concrete and structural design principles to enable students to perform advanced design of reinforced concrete structures. It emphasizes the design for torsion, shear and shear friction, and teaches how to perform the design of two-way slabs, walls, reinforcement at joints, multistory columns and concrete building systems in accordance with the latest building code.

CEGR 636: Artificial Neural Networks I
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course provides graduate students and engineering professionals with the fundamentals of Artificial Neural Networks. This course covers neural network architectures, algorithms, and applications. A wide variety of standard neural networks and training algorithms are covered in relationship to logic functions and other applications. Emphasis is on computational characteristics to illustrate similarities and differences among neural networks.

CEGR 638: Artificial Neural Networks II
Three Hours: 3 Credits
Prerequisites: **CEGR636**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This is a computational course and applies object-oriented methodology to programming artificial neural networks. Knowledge gained from this course will enable students to perform advanced application and research in Civil Engineering. Topics to be discussed include pattern class, link-list class, neural network base classes, adaline network, back propagation neural network, self-organizing neural network, and bi-directional associative memory.

CEGR 645: Construct Project Administration and Management
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course will teach the applications of the fundamentals of construction management in construction practice and teach the students the responsibilities and risks that are encountered in the construction industry in equipment and material utilization, costing, quality, productivity and safety in construction practice.

CEGR 646: Construction Engineering and Management for Engineering
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course will teach the students how the construction industry worldwide works and cover such areas as feasibility studies; organization for construction; financing and cost accounting for construction; design and engineering contracts and procedures; construction contracts; change orders and delays; acceleration; claims, arbitration, mediation, litigation; labor management; project planning.

CEGR 651: Computer Aided Highway Engineering Design
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.

This course covers the operational, geometric and hydraulic design of highways to achieve safe and efficient vehicle operation under conditions of uninterrupted flow.

CEGR 655: Traffic Engineering I
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
The principles of traffic engineering involve the analysis, planning and design of loads, streets and highways, and their related networks. Coverage includes the dynamics of traffic flows, traffic studies, and data collection; capacity analysis of freeways and arteries; the analysis and design of traffic control systems, including signalized and unsignalized intersections.

CEGR 656: Transportation Models and Simulation Analysis I
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
The theory, development, and application of modeling systems commonly used in planning, engineering and operational analysis of transportation systems. The application and calibration of an existing transportation modeling system.

CEGR 657: Advanced Topics in Traffic Engineering
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Theory, analysis and design of coordinated traffic signal systems, traffic information systems and traffic management emphasizing area wide optimization, intermodal coordination and incident management.

CEGR 659: Pavement Analysis and Design
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
The analysis of pavement loading and the response of flexible and rigid pavements to loads. The design of pavements to achieve the desired performance and reliability. The management of pavement to optimize life-cycle performance.

CEGR 661: Airport Planning and Engineering
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
The planning and design of airports and their supportive infrastructural systems. The operational analysis of airports and the environmental considerations in their location, design, expansion, and operation.

CEGR 663: Readings in Environmental Engineering
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course is required to prepare students for doctoral dissertation. Selected topics from the current literature will include water and waste, air pollution, solid waste, hazardous wastes, ground water hydrology, hydraulics, etc.

CEGR 665: Random Vibrations and Nonlinear Dynamics
Three Hours: 3 Credits
Prerequisites: **CEGR 631**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Review of linear systems. Time Domain vs. Frequency Domain approaches. Introduction to Nonlinear Systems. Phase Plane representation. Existence and Stability using Averaging methods. Random Vibrations. Response of SDOF and MDOF systems subjected to random excitation.

CEGR 670: Special Topics in Highway Safety
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This is an elective course which discusses highway safety and design issues. The design of horizontal and vertical alignments as well as transition curves is covered. The causes of highway accidents and their relations to highway design elements such as side slope, roadway width, and sight distance, as well as to human elements are thoroughly investigated. Analysis of high accident locations, accident reducing measures, and highway economics is also covered. Students are expected to complete a course project in the broad area of highway safety and design.

CEGR 671: Traffic Flow Theory
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Advanced topics in traffic flow theory for non-interrupted and interrupted flows. Topics include speed flow and density; shock waves in traffic streams; gap acceptance. Queuing theory and probabilistic processes as applied in the analysis of interrupted traffic flows. Applications in highway, traffic signals and terminal systems design.

CEGR 673: Advanced Environmental Engineering Design
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Covers basic parameters and elements in planning, development of design parameters, conceptual design, hydraulic and/ or pneumatic profiles, innovation, cost, and financing. Possible topics included water treatment systems, wastewater treatment, stormwater management systems, air pollution controls, site remediation technologies, etc. This course is a design course that involves real-life projects that the students have selected from the proceeding list of topics and approved by the instructor.

CEGR 680: Highway Infrastructure Management Systems
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course deals with the development of computerized maintenance management systems for the integrated management of transportation infrastructures. It addresses the requirements of the Government Accounting Standard Board (GASB) Statement 34, required to be followed on transportation maintenance projects. Modeling and management of highway maintenance, bridge maintenance, and pavement maintenance are discussed. Depreciation of highway assets over time and correlation between highway maintenance and infrastructure security are covered.

CEGR 681: Theory of Traffic Flow
Three Hours: 3 Credits

Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Study and evaluation of various qualitative descriptions of the complex phenomenon of traffic flow. The concept and mathematical models considered are statistical relationships, car-following analogy, queuing theory, traffic-network analysis, computing machine simulation studies, mathematical experiments, and distribution-function theories.

CEGR 684: Advanced Algorithms in Transportation I
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
An introduction to graphs and networks, their properties and values in systems analysis, identification and formulation of standard problems, and basic techniques available to solve them. Spanning trees, shortest paths, traveling salesman problem, routing and scheduling, facility location problems, flow problems, covers and matchings. Applications and decision analysis. Emphasis on problem identification, use of computer packages, and the relationship of network properties to solution efforts.

CEGR 685: Advanced Algorithms in Transportation II
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This is an advanced level transportation engineering course focusing on development and applications of various algorithms in transportation problem solving. It involves modeling and analysis of transportation network problems through the design, analysis, and implementation of algorithms. Emphasis is placed on the use of quantitative techniques of operations research to model system performance.

CEGR 686: Demand Analysis and Forecasting
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Analysis and forecasting of demand for facilities and services, for use in the planning, design, and operations of transportation systems. Emphasis on the collection and analysis of survey data for demand model development. Covers alternative sample designs, individual choice theories, probabilistic discrete choice models, estimation of desegregate and aggregate models, aggregate forecasting methods and simulation. Illustrated with applications from the field of transportation planning. Hands on exercises in the use of PC statistical analysis software.

CEGR 687: Ground Water Hydrology
Three Hours: 3 Credits
Prerequisites: **Hydrology and MATH(PDE) applications**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Theory of ground water movement, storage exploration, and pumping tests. Design of ground water recovery and recharge systems.

CEGR 688: Advanced Mechanics of Solids
Three Hours: 3 Credits
Prerequisites: **Advanced Strength of Materials**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Mechanical response of materials, including elastic, plastic and viscoelastic components. Continuum mechanics; kinematics of deformation, analysis of states of stress and strain, conservation of mass, balance

of momentum and energy, constitutive equations. Discussion of applications including stress tracks at defects, metal processing, and composite materials.

CEGR 690: Adaptive Structures
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Behavior of engineering structures subject to induced internal deformations. Transduction devices and adaptive physical systems. Excitation and response of adaptive structures. Actuator placement and static control. Extension to the dynamic case and active vibration control.

CEGR 691: Spacecraft Dynamics and Control
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Altitude dynamics and control of spacecraft. Overview of spacecraft systems and orbit determination. Rigid body kinematics and dynamics, and linear control concepts. Active and passive stabilization of spacecraft. Altitude control subsystems and hardware components, and design technology. Illustrations with available real examples and applications.

CEGR 692: Theory of Elastics
Three Hours: 3 Credits
Prerequisites: **Continuum Mechanics; Applied Engineering Mathematics (ODE and PDE, Probability and Fourier series)**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course presents the continuum concepts of stress, stress boundary conditions, principal stresses and the equations of equilibrium; Generalized Hook's law; Small strain theory and principal strains; Plane problems; Stress functions; Saint Venant torsion and flexure; Introduction to three-dimensional problems; Thermoelasticity; Anisotropic solutions.

CEGR 695: Discrete-Time Control Engineering
Three Hours: 3 Credits
Prerequisites: **Linear systems and control**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Design of controllers for discrete-time systems, with emphasis on linear sampled-data control. Single- loop digital controllers. Discrete-time state space design. Discrete-time optimal control. Realization of microcomputer real-time control systems. Design problems and applications with hands-on experience.

CEGR 697: Geographic Information Systems Applications in Transportation
Three Hours: 3 Credits
Prerequisites: **Geographic Information Systems**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course explores Geographic Information Systems (GIS) applications in transportation (GIS-T). The underlying concepts in GIS applications as well as advantages of GIS over non-GIS methods will be covered extensively. Students will be introduced to GIS softwares including ArcView GIS, MapObjects, and other relevant GIS tools. Finally, a number of GIS applications in real-world problem solving will be reviewed.

CEGR 702: Seismic Design
Prerequisites: **CEGR 629, CEGR 631**
Co-requisites: None

Term(s) offered: Fall or Spring or as needed.
This course provides for the seismic design of buildings. Dynamic analysis of single and multidegree-of-freedom elastic systems subjected to earthquake motions. Earthquake Design Spectra Analysis. Inelastic dynamic response analysis. Consideration of new building code requirements.

CEGR 703: Geometrically Nonlinear Structural Analysis
Prerequisites: **Matrix Structural Analysis, Advanced Structural Mechanics and EEGR 505**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course provides a basic background in the theory of geometrically nonlinear structural analysis. Formation of geometric stiffness matrices. Nonlinear analysis of trusses, plane frames, space frames, membrane, and cable net structures. Development of three-dimensional beam-column theory.

CEGR 704: Innovations in Structural Steel Design
Three Hours: 3 Credits
Prerequisites: **Advanced Steel Design (or its equivalent)**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course provides for the study of innovations in structural steel design. Ductile design concepts of steel structures and the systematic methods and applications of plastic analysis concepts required to describe the structural behavior associated with ductile design are presented. Design procedures and detailing requirements for ductile braced frames and ductile moment-resisting frames. Consideration of new building code requirements.

CEGR 705: Mechanics of Composite Materials
Three Hours: 3 Credits
Prerequisites: **CEGR 692**
Co-requisites: None
Term(s) offered: Fall or Spring
Basic mechanics of composite materials. Stress Strain relationship of orthotropic materials. Introduction to micromechanics. Classical lamination theory. Mechanical behavior of fiber reinforced composite materials. Damage and failure criteria.

CEGR 709: Wave Propagation in Elastic Media
Three Hours: 3 Credits
Prerequisites: **Continuum Mechanics**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Mechanical wave propagation in bounded and unbounded media. Wave reflection and transmission at interfaces and boundaries; stress waves. Additional topics of mutual interest to students and instructor.

CEGR 723: Advanced Consolidation Theory
Three Hours: 3 Credits
Prerequisites: **Soil Mechanics, MATH(PDE)**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
The fundamentals of soil consolidation theory are addressed in detail. Based on principles of continuum mechanics and constitutive relations, governing equations are derived for the deformation of the saturated skeletal frame. These in turn are tested against laboratory measurements. Unsolved problems in consolidation theory are emphasized.

CEGR 725: Aquifer Mechanics
Three Hours: 3 Credits
Prerequisites: **Soil Mechanics, Advanced Hydrology or Hydrodynamics of Groundwater, Math (PDE).**
Co-requisites: None

Term(s) offered: Fall or Spring or as needed.
Emphasis on mechanical characteristics of pore flow and skeleton matrix within an aquifer system; motion of pore flow and aquifers, including vertical and horizontal movement of aquifers; interaction between pore flow and skeleton matrix of sedimentary material. Solving Environmental problems related to land subsidence and fissures due to ground fluid (gas, oil and water).

CEGR 726: Geosynthetics
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course provides graduate students and engineering professionals with knowledge of geosynthetic materials and methods for application procedures in geotechnical and foundation engineering. Geotextiles, geogrids, geosynthetic clay liners, and geocomposites are among the geosynthetic topics of application and procedures. Designing with geosynthetics, application procedures, and specifications are topics of this course.

CEGR 730: Constitutive Laws in Geomechanics
Three Hours: 3 Credits
Prerequisites: **Advanced Soil Mechanics, Continuum Mechanics, and MATH(PED).**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Fundamental concepts of stress and strain tensors, criterion of failures for geomaterials. Theory of elasticity, viscosity, and plasticity, and their combinations such as elasto-viscous, elasto-plastic models in geomechanics for clay and sandy soils. Discussion of classic models in geomechanics and their applications to engineering.

CEGR 731: Advanced Soil Mechanics I
Three Hours: 3 Credits
Prerequisites: **Soil Mechanics**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Mechanics of seepage and groundwater flow. Effect of seepage on stability, uplift, and foundation design. Basic lateral earth pressure relationships. Stability analysis. Design of breakheads, cofferdams, retaining walls and slopes.

CEGR 737: Continuum Mechanics
Three Hours: 3 Credits
Prerequisites: **MATH(PDE), Engineering Mechanics and Mechanics of Materials.**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Emphasis on theoretical study of continuum mechanics including introduction to tensor analysis; analysis of stress and strain tensors; motion and deformation; conservation laws; constitutive laws. Applications to porous material or sedimentary material in geomechanics and geotechnical engineering.

CEGR 738: Boundary Element Method in Geomechanics
Three Hours: 3 Credits
Prerequisites: **Mechanics of Materials, Soil Mechanics, MTH(PED) and Programming in FORTRAN or C**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Theoretical concepts and principles of the Boundary Element Method (BEM) and applications to Geo-mechanics and Geotechnical Engineering. Establishment of conceptual, mathematical, numerical, and mechanical models. Time and spatial discretization. Solution of matrix equations and programming in FORTRAN and C. Applications of BEM to geomaterials which exhibit linear and nonlinear elastic,

viscous, and elasto-plastic behavior. Applications of BEM to solve 2D and 3D problems in Geotechnical Engineering.

CEGR 739: Discrete Element Method in Geomechanics
Three Hours: 3 Credits
Prerequisites: **Engineering Mechanics, Soil Mechanics, and programming in FORTRAN or C.**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Advanced concepts, principles, programming, and applications of the Discrete Element Method (DEM) in Geomechanics and Geotechnical Engineering. Parameter and determination. Contacting laws and constitutive models. Modeling of rigid block and granular materials. Modeling of deformable block and granular materials. Establishment of conceptual, physical, numerical, and mathematical models. Discretization in space and time. Programming for computation and user-friendly interfaces in Visual Basic. Applications of the DEM in solving engineering problems.

CEGR 740: Special Topics in Geographic Information Systems
Three Hours: 3 Credits
Prerequisites: **Geographic Information Systems and Remote Sensing**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Advanced concepts, principles, and applications of GIS are presented and illustrated. Project design, data acquisition, management, analyses, and display/product generation will be emphasized. Applications of GIS methodologies in real world problems from various disciplines will also be presented. Students will be required to complete a GIS project as the final examination grade for the course. ESRI's ARCINFO and ArcView will form the basic GIS software for the course.

CEGR 741: Special Course in Remote Sensing
Three Hours: 3 Credits
Prerequisites: **Geographic Information Systems (GIS)**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Advanced concepts, principles, and applications of RS are presented and illustrated. Project design, data acquisition, management, analyses, and display/product generation will be emphasized. Applications of RS methodologies in real world problems from various disciplines will also be presented. Students will be required to complete an RS project as a final examination grade for the course. ENVI and ERDAS will form the basic GIS software for the course.

CEGR 742: Geographic Information Systems (GIS) Modeling in Raster
Three Hours: 3 Credits
Prerequisites: **Geographic Information Systems (GIS)**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Advanced geographic information system (GIS) modeling concepts, principles, methodology, and applications are presented and illustrated. Map algebra, pattern recognition, model formulation, implementation and verification, and advanced raster data structures for dynamic modeling will be emphasized. Cross-disciplinary approaches of GIS modeling of the real-world problems will also be presented. Students will be required to complete a GIS modeling project, make an oral presentation, and submit a written report of their findings as part of the final grade for this course.

CEGR 743: Finite Element Method in Geomechanics
Three Hours: 3 Credits
Prerequisites: **Mechanics of Materials, Soil Mechanics, MATH(PDE) and FORTRAN or C Programming.**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.

Theoretical concepts and principles of the Finite Element Method (FEM) as well as applications to Geomechanics and Geotechnical Engineering. Establishment of conceptual, mathematical, numerical, and mechanical models. Time and spatial discretization. Solution of matrix equations and programming in FORTRAN and C. Applications of FEM to geomaterials which exhibit linear and nonlinear elastic, viscous, elasto-plastic behavior. Applications of FEM to solve 2D and 3D problems in Geotechnical Engineering.

CEGR 744: Tensor Analysis in Geomechanics
Three Hours: 3 Credits
Prerequisites: **Vector and Matrix Analysis**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Concepts, principles of tensors and their applications in Geomechanics. Coordinates and transformation of coordinates. Vectors and tensors, stress and strain tensors in elasticity. Gradient, divergence and rotations, derivatives of tensors and applications to Geomechanics.

CEGR 745: Advanced Analysis of Slope Stability
Three Hours: 3 Credits
Prerequisites: **Soil Mechanics**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Study advanced concepts and principles in limit equilibrium theory. Analyze soil and rock slope stability with theoretical approaches as well as numerical methods (e.g., FEM and FDM). Apply the limit equilibrium theory to slope stability. Back analysis and its applications to prediction of potential failure of slope. Slope design and problem solving in Geotechnical and Geological Engineering.

CEGR 746: Advanced Soil Dynamics
Three Hours: 3 Credits
Prerequisites: **Soil Dynamics, MATH(PDE), Mechanics of Materials.**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Emphasis on theoretical and applied study in soil dynamics including soil stress-strain relations, strength and failure under dynamic loading, loading rate effect, small and larger deformation under repeated loading, propagation of stress wave in soils. Investigation of soil dynamic parameters through lab and field. Solving problems in engineering such as sand liquefaction due to earthquake, foundation stability analysis under vibration, wave propagation because of pile driving or earthquake, etc.

CEGR 747: Well Hydraulics
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course emphasizes theoretical and applied well hydraulics including steady and unsteady flow toward a well within confined, semi-confined or unconfined aquifers. Analytical solutions of well drawdown, analysis of aquifer parameters through aquifer testing, and applications to water resources exploitation are discussed.

CEGR 748: Design of Pile Foundations
Three Hours: 3 Credits
Prerequisites: **Geotechnical Engineering**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Study of theories and principles such as structure characteristics, load transfer mechanics, pile load tests, consolidation settlement of group piles, negative skin friction laterally loaded piles. Design of different types of pile foundations, estimate pile length and installation of piles.

CEGR 749: Earthquake Engineering

Three Hours: 3 Credits
Prerequisites: **Soil Dynamics**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course covers seismic wave and its propagation in porous media, analytical and numerical analysis for elastic, plastic and viscous waves, analysis of ground motion and field responses due to an earthquake, soil-structure interaction induced by earthquakes, soil liquefaction and site characterization, geotechnical designs with consideration of seismic forces.

CEGR 750: Advanced Geotechnical Experiments
Three Hours: 3 Credits
Prerequisites: **Soil Engineering**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course emphasizes advanced geotechnical experiments conducted in laboratories and fields, including designing and planning geotechnical tests, introduction to conventional and advanced laboratory and field equipment, data acquisition experiments, and stress analysis for experimental investigation.

CEGR 755: Construction Cost Management
Three Hours: 3 Credits
Prerequisites: **CEGR 645 or 646**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course will teach the students cost estimating concepts as it relates to owners and contractors in the construction industry. Students will acquire the skills to manage and control projects' costs that would benefit the owner, the contractor and the public at large.

CEGR 756: Advanced Construction Cost Management
Three Hours: 3 Credits
Prerequisites: **CEGR 645 or 646**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course will introduce the student to the advanced construction cost management concepts. It will enhance the student's knowledge of financial analysis and develop competence in advanced construction cost estimation and management.

CEGR 760: Dissertation Research & Writing for Construction Students
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course will teach the students topic selection, research planning, data collection and methodology, including the structuring and writing the dissertation.

CEGR 765: Law for Architects, Business, Engineers and Construction Managers
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course explores legal concepts related to architects, business, engineers and construction managers. It will encourage students to become conscious of the legal implications of their actions as professionals and how to adapt the legal concepts to the day-to-day practice.

CEGR 780: MSU/JHU Engineering Education Study
Two to Six hours: 2-6 Credits
Prerequisites: **None**

Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course will facilitate educational exchange between students at Morgan State University and Johns Hopkins University.

CEGR 787: Seminar I
Three Hour: 3 Credit
Prerequisites: **None**
Co-requisites: None
This 3-credit seminar course is an interdisciplinary engineering course, required for graduate students pursuing a Ph.D. in the department of civil/electrical/industrial engineering, also an elective course for the graduate students pursuing other graduate programs. There is no prerequisite for this course.

CEGR 788: Seminar I
One Hour: 1 Credit
Prerequisites: **Instructor Approval**
Co-requisites: None
This is the first part of an advanced seminar course taken during the first two semesters of the Master of Engineering Program in which students from different engineering disciplines (Civil, Electrical, and Industrial Engineering) work together to identify and solve problems.

CEGR 789: Seminar II
One Hour: 1 Credit
Prerequisites: **None**
Co-requisites: None
This is the second part of an advanced seminar course taken during the first two semesters of the Master of Engineering Program in which students from different engineering disciplines (Civil, Electrical, and Industrial Engineering) work together to identify and solve problems.

CEGR 790: Research in Civil Engineering I
Three Hours: 3 Credits
Prerequisites: **Instructor Approval**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course provides for independent inquiry into a civil engineering related topic. Through research of appropriate literature, the student will gain depth in a particular subject area or breadth in other fields related to civil engineering. At the commencement of the semester, a student must submit an outline of the proposed work for approval. A written report is required.

CEGR 791: Research in Civil Engineering II
Three Hours: 3 Credits
Prerequisites: **CEGR 790**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This is the second part of a CEGR 790 course and continues research related to the civil engineering related topic. At the end of the semester, a student must submit the final report for the proposed work by CEGR 791 to the supervising faculty member. A final report is required.

CEGR 793: Project Guidance
Two Hours: 2 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course provides a non-thesis student who has not completed their Project Report in the assigned semester, a mechanism for continuing their work under faculty supervision. Although a two credit course, it is reported as a nine credit course to provide full-time status for those students taking fewer than nine credits in a semester.

CEGR 795: Project Report I
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Project Report I provides a student with an opportunity to formulate a proposal for a professional engineering project. The student may work as a project at the University or off-site, under the supervision of a faculty advisor.

CEGR 796: Project Report II
Two Hours: 2 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Project Report II follows up on the approved project proposal developed in CEGR 795. Under the supervision of a faculty advisor, the student must address advanced professional engineering issues, which may include analysis, design, synthesis, feasibility, development of alternatives, standards and codes, and other relevant issues as defined in Project Report I. This professional engineering experience culminates in a final report.

CEGR 797: Thesis Guidance
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Thesis guidance provides students, who have not completed their thesis in CEGR 799, a mechanism for continuing work under faculty supervision. Thesis Guidance courses earn "S" grades.

CEGR 799: Thesis Defense
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This is the initial course for students conducting research and writing a thesis under faculty supervision. The grade is "IP" until the thesis is completed and approved. Students are required to take CEGR 799 before CEGR 797.

CEGR 805: Pre-Candidacy Research I
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course is intended as a rotational research opportunity for students. Students will conduct research driven by the instructor/PI to advance a research objective. The course will work through research issues and solutions utilizing current research projects being undertaken by the faculty. In addition, this course will enable a PhD student to develop a scholarly research plan of their own in consultation with the student's dissertation committee chairperson. This course aims for the student to experience various research methods/techniques while developing their plan of action for completion of the dissertation.

CEGR 810: Pre-Candidacy Research II
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course is intended as a rotational research opportunity for students. Students will conduct research driven by the instructor/PI to advance a research objective. The course will work through research issues and solutions utilizing current research projects being undertaken by the faculty. In addition, this course will enable a PhD student to develop a scholarly research plan of their own in consultation with the student's dissertation committee chairperson. This course aims for the student to experience various research methods/techniques while developing their plan of action for completion of the dissertation.

CEGR 815: Pre-Candidacy Research III
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course is intended as a rotational research opportunity for students. Students will conduct research driven by the instructor/PI to advance a research objective. The course will work through research issues and solutions utilizing current research projects being undertaken by the faculty. In addition, this course will enable a PhD student to develop a scholarly research plan of their own in consultation with the student's dissertation committee chairperson. This course aims for the student to experience various research methods/techniques while developing their plan of action for completion of the dissertation.

CEGR 820: Pre-Candidacy Research IV
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course is intended as a rotational research opportunity for students. Students will conduct research driven by the instructor/PI to advance a research objective. The course will work through research issues and solutions utilizing current research projects being undertaken by the faculty. In addition, this course will enable a PhD student to develop a scholarly research plan of their own in consultation with the student's dissertation committee chairperson. This course aims for the student to experience various research methods/techniques while developing their plan of action for completion of the dissertation.

CEGR 825: Pre-Candidacy Research V
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course is intended as a rotational research opportunity for students. Students will conduct research driven by the instructor to advance a research objective. The course will work through research issues and solutions utilizing current research projects being undertaken by the faculty. In addition, this course will enable a PhD student to develop a scholarly research plan of their own in consultation with the student's dissertation committee chairperson. This course aims for the student to experience various research methods/techniques while developing their plan of action for completion of the dissertation.

CEGR 905: Dissertation Research I
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course enables a PhD candidate to execute the scholarly research plan (previously developed in the pre-candidacy phase) in consultation with the student's dissertation chairperson and committee. A student can only take this dissertation course after passing the A-Exam and being advanced to candidacy.

CEGR 910: Dissertation Research II
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course enables a PhD candidate to execute the scholarly research plan (previously developed in the pre-candidacy phase) in consultation with the student's dissertation chairperson and committee. A student can only take this dissertation course after passing the A-Exam and being advanced to candidacy.

CEGR 915: Dissertation Research III
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.

This course enables a PhD candidate to execute the scholarly research plan (previously developed in the pre-candidacy phase) in consultation with the student's dissertation chairperson and committee. A student can only take this dissertation course after passing the A-Exam and being advanced to candidacy.

CEGR 920: Dissertation Research IV
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course enables a PhD candidate to execute the scholarly research plan (previously developed in the pre-candidacy phase) in consultation with the student's dissertation chairperson and committee. A student can only take this dissertation course after passing the A-Exam and being advanced to candidacy.

CEGR 925: Dissertation Research V
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
This course enables a PhD candidate to execute the scholarly research plan (previously developed in the pre-candidacy phase) in consultation with the student's dissertation chairperson and committee. A student can only take this dissertation course after passing the A-Exam and being advanced to candidacy.

CEGR 993 – Pre-Doctoral Candidacy
Three Hours: 3 Credits
Prerequisites:
None Co-
requisites: None
Term(s) offered: Fall or Spring or as needed.
This course establishes the student as a full-time student engaged in study prior to the achievement of doctoral candidacy. Students studying for comprehensive examinations or preparing for a proposal defense enroll in this course. This course is a non-curricular course and cannot be used as a program credit requirement. The student registers for 3 credit hours and the registration reports the full-time status of 9 graduate credit hours.

CEGR 997 – Dissertation Guidance
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
Thesis guidance provides students who have not completed their dissertation in CEGR 998, a mechanism for continuing work under faculty supervision. Dissertation Guidance courses earn "S" grades. The course registration maintains the student status as a matriculated, full-time student (student is registered for 3 credit hours and the system reports a full-time 9 credit hour load). CEGR 997 will not count towards curricular coursework. Other courses cannot be substituted for CEGR 997.

CEGR 998 – Dissertation Defense
Three Hours: 3 Credits
Prerequisites: **None**
Co-requisites: None
Term(s) offered: Fall or Spring or as needed.
After the Intent to Defend the Dissertation form have been received by the School of Graduate Studies, the CEGR 997 registration will be changed to CEGR 998 (Dissertation Defense) for the given semester and count for 3 credit hours of curricular coursework (It will be counted for a full-time 9 credit hour load).

APPENDIX C: CIVILAND ENVIRONMENTALENGINEERING FACULTY AND STAFF

C1. Faculty and Staff Contact Information (Full Time)

NAME	TITLE	OFFICE	PHONE	EMAIL
NIKARA WILLIAMS	ADMINISTRATIVE ASSISTANT	CBEIS 101	443-885-3098	NIKARA.WILLIAMS@MORGAN.EDU
BROWN, CECELIA WRIGHT	LECTURER	CBEIS 204	443-885-2269	CECELIA.WRIGHTBROWN@MORGAN.EDU
EFE, STEVE	ASSOCIATE PROFESSOR	CEBIS 233	443-885-3295	STEVE.EFE@MORGAN.EDU
EMAD GHEIBI	LECTURER	CBEIS 210	443-885-4552	EMAD.GHEIBI@MORGAN.EDU
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SHOKOUHIAN, MEHDI	ASSOCIATE PROFESSOR	CEBIS 205	443-885-4873	MEHDI.SHOKOUHIAN@MORGAN.EDU

C2. Faculty and Staff Contact Information (Part Time)

NAME	TITLE	OFFICE	PHONE	EMAIL

C3. Faculty Members and Research Interests

1. **Steve Efe**, Associate Professor, D.E., Morgan State University. Research interest: earthquake engineering, linear and non-linear finite element applications in structural engineering, failure analysis of steel and steel-concrete buildings and bridges, vibration control of structural systems, protection of structures, buildings, bridges, and other structures against hazards and attacks, materials behavior and constitutive modeling
2. **Emad Gheibi**, Lecturer, Ph.D., University of South Carolina, Research interests: Ground improvement, seismic geohazard assessment, liquefaction analysis of coastal areas, infrastructure resilience and sustainability, geohazard and landslide, geomechanics and composite materials, climate change and geo-environment.
3. **James Hunter** Jr., Associate Professor; Ph.D., Purdue University. Research Interest: Environmental engineering, ecological engineering, coastal and urban green Infrastructure, and Watershed Systems Design.
4. **Dong Hee Kang**, Associate Professor; Ph.D. Purdue University. Research Interests: the potential stormwater impacts of urbanized; critical water bodies and urban infrastructure contribution to pollutant loading; treatment efficacy of nitrogen and phosphate; the dominant mechanism of fate and transport of emerging contaminants.
5. **Jiang Li**, Professor; Ph.D., University of Nevada-Reno. Research Interest: hydrogeology, aquifer mechanics, soil and rock mechanics, land movement due to ground fluids withdrawal.
6. **Yi Liu**, Associate Professor; D.E., Morgan State University. Research Interest: geotechnical engineering, geohydrology, aquifer mechanics, modeling of land subsidence and sea level rise.
7. **Gbekeloluwa Oguntimein**, Lecturer; Ph.D. Iowa University; M.S., University; B.S.E.E, University. Research Interests: environmental engineering, biochemical engineering, chemical engineering, and food process engineering.
8. **Oludare Owolabi**, Associate Professor; PhD., Georgetown University. Research Interests: pavement engineering, soil mechanics, physical and numerical modeling of soil structures, computational geo-mechanics, geo-structural systems analysis, structural mechanics, sustainable infrastructure, and material development.
9. **Kiruthia Saminanthan**, Lecturer, GIS, Survey and Geospatial analysis.
10. **Zhuping Sheng**, Professor, Ph.D., University of Nevada-Reno, Research Interest: hydrogeology, aquifer mechanics, soil and rock mechanics, geohazards, landslides, land subsidence and earth fissures, water resources planning and management, managed aquifer recharge.
11. **Mehdi Shokouhian**, Associate Professor, Ph.D., Tsinghua University. Research interest: design and stability of structures made of high-performance materials using theoretical, numerical and experimental methods, structural bracing systems for high rise buildings to achieve higher ductility and energy-dissipating capacity of steel structures in severe earthquakes.
12. **Cecelia Wright Brown**, Lecturer, D.E., Morgan State University, Research Interest: construction engineering, project management, construction management and policies.