

NEW COURSE PROPOSAL

GRADUATE Level I (Masters & Phd courses) _____ Level II (Phd courses) _____

UNDERGRADUATE X

SCHOOL, DEPARTMENT, COLLEGE: CEE, COE

DATE: 05/10/2017

1. Proposed Subject Code & Course Number: (Verify with Registrar's Office) CEE 4150	2. Hours: LECTURE <u> 3 </u> LAB/RECITATION _____ SEMESTER CREDIT <u> 3 </u> <i>Is this course repeatable for credit?</i> _____																		
3. Descriptive Title: Construction Management & Megaprojects																			
4. Recommended Abbreviation for Transcript – (24 characters including spaces): <div style="border: 1px dashed black; padding: 5px; text-align: center; font-family: monospace; font-size: 1.2em;"> C O N S T M G T M E G A P R O J E C T S </div>																			
5. Catalog Description – (25 words or fewer) Covers planning and development of megaprojects. Addresses social, environmental, and economic impacts of megaprojects. Discusses cultural differences & ethical issues in managing megaprojects.																			
6. Preferred Grade Basis: <u> L/G </u> P/F _____ Audit _____ (Note: The default is all grade modes allowed. If this is not preferred for this course, please explain why that is the case.)																			
7. Prerequisites: (For graduate level courses, Graduate Standing or Permission of Instructor is assumed) CEE 3770, ISYE 3770, or MATH 3670 Prerequisites with concurrency: _____ Corequisites: _____																			
8. Has the course been taught as a special topic? Yes _____ If YES, When: Springs 2016 & 2017 Enrollment: 47 & 63, respectively																			
9. Is this course equivalent to another course (graduate or undergraduate) taught at Ga. Tech? No _____ If yes, list course number(s): _____																			
10. For undergraduate courses, are you requesting that this course satisfy: Humanities _____ Social Science _____ Ethics _____ Global Perspective _____																			
11. Expected Mode of Presentation:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">MODE</th> <th style="width: 40%;">% of COURSE</th> </tr> </thead> <tbody> <tr> <td rowspan="5"> <ul style="list-style-type: none"> Lecture </td> <td>Lecture</td> <td>50%</td> </tr> <tr> <td>Discussion</td> <td>20%</td> </tr> <tr> <td>Seminar</td> <td>10%</td> </tr> <tr> <td>Demonstration</td> <td>20%</td> </tr> <tr> <td>Other (Specify)</td> <td></td> </tr> <tr> <td rowspan="2"> <ul style="list-style-type: none"> Lab/Recitation </td> <td>Supervised</td> <td></td> </tr> <tr> <td>Unsupervised</td> <td></td> </tr> </tbody> </table>	MODE	% of COURSE	<ul style="list-style-type: none"> Lecture 	Lecture	50%	Discussion	20%	Seminar	10%	Demonstration	20%	Other (Specify)		<ul style="list-style-type: none"> Lab/Recitation 	Supervised		Unsupervised	
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12. Planned Frequency of Offering:	<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 60%;">TERM TO BE OFFERED</th> <th style="width: 40%;">EXPECTED ENROLLMENT</th> </tr> </thead> <tbody> <tr> <td>Fall</td> <td></td> </tr> <tr> <td>Spring</td> <td>50</td> </tr> <tr> <td>Summer</td> <td></td> </tr> </tbody> </table>	TERM TO BE OFFERED	EXPECTED ENROLLMENT	Fall		Spring	50	Summer											
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13. Probable Instructor(s) – <i>Please mark with an asterisk any non-tenure track individuals.</i> Baabak Ashuri and Yong Cho																			
14. Purpose of Course: Relation to other courses, programs and curricula: This course is one of the core courses in an institute minor program in Global Engineering Leadership (GEL). Also, this course is part of Georgia Tech's Serve-Learn-Sustain (SLS) initiative.																			
15. Required <u> Elective </u>																			
16. Submit a course syllabus																			
17. Can the class count toward degree requirements at Georgia Tech? Yes _____																			
18. Is this class restricted to Free Elective only? _____																			

Course Policy, Procedures, and Syllabus
CEE-4150 – Construction Management & Megaprojects
Georgia Institute of Technology

COURSE SUMMARY

Course Title	Construction Management & Megaprojects
Course No	CEE 4150
Catalog Description	<p>Introductory course in managing megaprojects. Covers methods, models, and best practices for efficient delivery of megaprojects. Addresses social, environmental, and economic impacts of megaprojects. Discusses cultural differences & ethical issues in the development of megaprojects.</p> <p>3.000 Credit Hours</p> <p>3.000 Lecture Hours</p>
Prerequisites	CEE 3770, ISYE 3770, or MATH 3670
Semester/Year	Spring 2018
Instructor	Baabak Ashuri
Office	Room 228, Caddell Building
Office Phone	(404) 385-7608
E-mail Address	baabak@gatech.edu
Office Hours	F 2:00-3:00 pm or by appointment
Class Schedule	F 11:15am-2:00pm, Sustainable Education 121
Grader	TBD
Textbooks	<ul style="list-style-type: none"> Managing Gigaprojects Advice from Those Who've Been There, Done That Edited by Patricia D. Galloway, Ph.D., P.E.; Kris R. Nielsen, Ph.D., J.D.; and Jack L. Dignum, ASCE Press, 2013/480 pp. (Will be posted on T-square) Megaproject Planning And Management: Essential Readings, Edited by Bent Flyvbjerg, Edward Elgar Publishing, 2014/1,400 pp. (Optional)
Course Description, Goal, and Objectives	<p>“Restore and improve urban infrastructure” is one of the 14 grand challenges for engineering in the 21st century, according to the National Academy of Engineering (NAE). “Society faces the formidable</p>

challenge of modernizing the fundamental structures that will support our civilization in centuries ahead.” Megaprojects have unique characteristics that make them exceptionally difficult to manage: great size (both in scope and dollar value), technical complexity, long timeframe, massive environmental and social impacts, high risk level, diverse stakeholders with often conflicting interests and sometimes varied cultural backgrounds, and possible contractual, legal, and ethical issues. It is expected that this course provides a foundation for students to understand what it takes to become a visionary and technically capable leader to work in a complex megaproject environment. It is anticipated that students learn how to think strategically about the challenges of megaprojects, effectively communicate the issues with the project team, lead and motivate people to achieve the common project goals, deal with adversity and setbacks, and facilitate the smooth transition of the project throughout various phases of the project lifecycle. Students are also taught to think critically about the impacts of megaprojects on the surrounding communities. Several case studies of real-world megaprojects will be reviewed and analyzed by students throughout the course to achieve the learning objectives. Students will implement what they have learned throughout the course in a final group project that researches an ongoing megaproject development, preferably in the City of Atlanta or the State of Georgia. Students will be given an opportunity to combine their academic and career interests with their aspiration to create more sustainable communities.

Learning Objectives

The learning objectives of this course are the following:

- Identify governance structures for megaprojects
- Explain & implement front-end planning (or front-end loading (FEL))
- Define project delivery systems, procurement methods, & contracting strategies
- Categorize funding sources & financing mechanisms for infrastructure systems
- Critique the utilization of public-private partnership (P3) for megaproject development
- Conduct environmental, economic and social sustainability assessment
- Distinguish issues related to community engagement & stakeholder management
- Debate cultural and ethical aspects of megaprojects

- Explore sustainable development through the lens of community engagement
- Identify basic legal concepts and articulate principles of risk allocation
- Describe the transition from procurement to project (Post Award)
- Describe critical interfaces for managing megaprojects
- Explain integrated project leadership for collaborative problem-solving

Assignment and Evaluation

Course grading is as follows:

A	B	C	D	F
90% and above	80%-89%	70%-79%	60%-69%	<60%

Grade Distribution

The following table summarizes the distribution of the grade for this course. Group projects will be graded for the entire group.

<i>Item</i>	<i>Percent</i>
Lecture Presentation	10%
Attendance*	5%
In-class Practice Assignments and Quizzes	20%
Assignments	40%
Final Project (Report & Presentation)	25%
TOTAL	100%

* Attendance will be taken on most of the classes and the related grades are updated shortly after each class.

COURSE OUTLINE

The course outline provides a general plan for the course. While reasonable efforts will be made to adhere to the outline, deviations may be necessary.

Week 1: Introduction to megaprojects

- Attributes of a megaproject
 - Complexity
 - Financial constraints, inherent risks, and extended performance period
 - High level of public attention
- Examples: Megaprojects to gigaprojects

Week 1: Governance of the megaproject

- Governance regimes for large complex projects
- Interaction between the project and the institutional framework throughout the life cycle
- Systems integration model for managing megaprojects
- Megaproject processes and sources of learning
 - Reconciling uncertainty and responsibility
 - Redrawing the borderlines of private and public involvement
 - Adopting specific measures to increase accountability:
 - Transparency
 - Performance specifications
 - Explication of regulatory regimes
 - Involvement of risk capital
- Transition from project to operations

Weeks 2-3: Front-end planning (or front-end loading (FEL))

- Front-end planning definition
- Front-end planning process
- Front-end planning objectives
- Front-end planning gated process
- Construction Industry Institute (CII) Front-end planning tools
 - Alignment Thermometer
 - Project Definition Rating Index (PDRI)

- Mega-Project Assessment of Criticality Tool (MPACT)

Weeks 4-5: Project delivery systems, procurement methods, & contracting formats

- History of project delivery systems
- Distinguishing project delivery systems
 - Design-build-bid (DBB), design-build (DB), construction manager/general contractor (CMGC), integrated project delivery (IPD), public-private partnership (p3), etc.
- Choosing the right project delivery system
- Procurement methods
- Contracting formats
- Integrated acquisition strategy

Weeks 6-7: Project finance

- Basic definitions & introduction to project finance
- Principals of project finance
- Project finance structure
- Project finance markets
- Financial model
- Investment valuation methods (e.g., NPV and IRR)
- Transportation infrastructure project finance
 - Highway funding sources and financing mechanisms in the U.S.

Week 8: Public-private partnership (P3)

- Definition of Public Private Partnerships (P3s)
- When should P3s be considered?
- P3s Worldwide Outlook
- Risk Management for P3s
- P3 Investment Evaluation
 - Value for Money (VfM) Analysis

Weeks 9-10: Sustainable assessment of megaprojects

- Planetary boundaries – Sustainability and triple bottom lines
- Life Cycle Assessment (LCA)

- Environmental LCA Model
- Overview of ISO LCA framework
 - Goal and scope definition
 - Life cycle inventory (LCI) analysis
 - Life cycle impact assessment
 - Result and Interpretation
- Life Cycle Cost Analysis (LCCA)
- LCA – Buildings
- LCA software
 - EIOLCA
 - Athena LCA
- An introduction to climate justice
 - Assessing the relative health impacts of climate change
- Extreme heat event projections and application with EJSCREEN (Environmental Justice Screening and Mapping Tool)

Week 11: Stakeholder management

- Stakeholder influence strategies in the context of global projects
- Stakeholder management during the project lifecycle
 - Mass media and social networking service as an extremely cost-effective way to increase the awareness of the public about the true impact of megaprojects
- Consensus building and flexibility
- Community engagement

Week 11: Cultural differences & ethical issues in megaprojects

- Ethics and advocacy in forecasting for public policy
 - The salience of forecasts in public policymaking
 - The political uses of forecasts
- Getting started with vocabulary
 - Kickbacks and bribery
 - Front companies
 - Bid rigging and collusion

- Conflicts of interest
- Fraud
- Tools and programs to promote ethical behavior
- Cultural issues in the context of multinational megaprojects

Weeks 12-13: Contract & risk management

- Basic legal concepts
- Principles of risk allocation
- Evaluating liability under different project delivery systems
- Variations in project teams & teaming agreements
- Procurement of the project team
- Standard form contracts
 - Key contract issues
 - Subcontracts
 - Insurance & bonding considerations
 - Key liability issues
- A systematic approach to risk management
 - Risk identification
 - Risk analysis
 - Response to risk
- Techniques of risk analysis
 - Qualitative vs. quantitative assessment

Weeks 14-15: Management of megaprojects during the post-award phase

- Post Award: Definition
- Teaming and Communications
- Post-Award Roles and Key Interfaces
 - Design-Value Interface
 - Design-Cost Interface
 - Design-Construct Interface
 - Design-Performance Interface

- Project Close-Out

COURSE POLICIES

In the following policies, ‘you/your’ indicates the ‘student’ and ‘instructor’ means ‘faculty’ or ‘professor.’

Policies and Expectations: This course will be an intense and sometimes frustrating educational experience; it is necessary that we all contribute to its success by following the course policies. You should not only be in class, but also strive to participate in class discussions when appropriate.

Assignment Deadlines: All assignments given are due on the date indicated. All students are expected to complete any and all assignments given. The instructor reserves the right to modify assignments as necessary. Assignments will be done as individual, as well as with your teammate(s). Descriptions and requirements will be distributed throughout the semester. You will not receive credit for late assignments. However, the instructor will accept and correct these assignments, in order to provide you with feedback that will be beneficial in the learning process.

Class Attendance Policies: Attendance is mandatory for all classes, unless you are ill or officially excused by the instructor as the result of participation in a university function. There are no “free cuts” permitted and there will be a penalty (as decided by the instructor) for not attending the class. If you attend fewer than 75% of the scheduled class meetings, you will not receive credit for the course. Any student arriving late for class or leaving early from class will be counted as absent from that class period. This policy is in your best interest, since attendance is essential for understanding some of the complex reasoning processes covered in this course which is critical for doing well in this class. In the case of unavoidable absences, you are responsible for making up the work done in class. It is not the instructor’s responsibility to provide the student with that information outside of class. For more on the Class Attendance Policies, you can refer to the Institute Absence Policy (<http://www.catalog.gatech.edu/rules/4/>).

It is your responsibility to obtain any missed information or handouts given in class from a classmate and you should exchange phone numbers or e-mail addresses with other students in the class to better facilitate note sharing, etc. No companions, friends, family, or pets are permitted in class.

Methods of Communicating: All assignments must be received by the deadline given. You can also ask questions and ask for clarification by e-mail, in class, or by visiting the instructor during the office hours or by appointment at his office.

Method of Instruction: The course may consist of a combination of lectures, discussion, guest speakers, videos, presentations by industry professionals, classroom games, and simulations.

Readings, Preparation and Participation: The reading assignments, problems cases, and discussion forums are integral elements of the course. Students are expected to complete readings and other assigned work *prior* to each class, in order to fully participate in the discussion. Learning is approached as a participatory process, which benefits from student/teacher and student/student interactions. Lectures are designed to bring together diverse information from various sources. Lecture notes will be posted on T-Square.

Laptop/Handheld Computer Use: Laptop/handheld computers may be used in class to take notes only, but not for other purposes, such as e-mail, web searches, chat, or other personal uses. Students using computers during class for work not related to that class must leave the classroom for the remainder of the class period. Abuse of this policy will result in the prohibition of laptop use by the student.

Cell Phones: All communication devices must be turned off in the classroom. The use of cell phones, beepers, or other communication devices is disruptive, and is therefore prohibited during class.

Make-up Quizzes & Class Activities: There will be no make-up quizzes without a valid Institute approval. Provide your instructor with a letter from the Institute to schedule a make-up test.

Food and Drink in the Classroom: Students are not allowed to bring food or drinks into classroom unless approved by the instructor.

Class Discussions: Your active and productive participation in class discussions is encouraged. Various viewpoints and opinions are encouraged and welcome. Questioning the ideas of others, including the instructor, is similarly welcome. However, the instructor will exercise his responsibility to manage discussion so that ideas and arguments can proceed in an orderly fashion. If your conduct during class discussions seriously disrupts the atmosphere of mutual respect, you will not be permitted to participate further.

Plagiarism: Students are expected to do their own work in this course. To use another writer's or speaker's ideas without giving proper credit by means of standard documentation is plagiarism. All course papers, notes, homework, and projects submitted to the instructor are subject to textual similarity review for the detection of plagiarism. All submitted papers will be included as source documents in the reference database for the purpose of detecting plagiarism of such papers. The instructor will follow the Institute's policy for plagiarism.

Academic Integrity: Georgia Tech aims to cultivate a community based on trust, academic integrity, and honor. Students are expected to act according to the highest ethical standards. For information on Georgia Tech's Academic Honor Code, please visit <http://www.catalog.gatech.edu/policies/honor-code/> or <http://www.catalog.gatech.edu/rules/18/>.

Any student suspected of cheating or plagiarizing on a quiz, exam, or assignment will be reported to the Office of Student Integrity, who will investigate the incident and identify the appropriate penalty for violations.

Accommodations for Students with Disabilities: If you are a student with learning needs that require special accommodation, contact the Office of Disability Services at (404)894-2563 or <http://disabilityservices.gatech.edu/>, as soon as possible, to make an appointment to discuss your special needs and to obtain an accommodations letter. Please also e-mail me as soon as possible in order to set up a time to discuss your learning needs.

Computer Specifications: For information on computer specifications to meet Georgia Tech standards, visit http://sco.gatech.edu/req_hw. Internet access is required for this course, as is an e-mail account for communication with the instructor.

Policy Changes: Information contained in the course syllabus, other than the grade and absence policies, may be subject to change with reasonable advance notice, as deemed appropriate by the instructor.

Any conflicts (personal or otherwise) with this course should be discussed as early as possible with the instructor and it will be at instructor's discretion to solve as equitably as possible. Please note: do not wait to discuss course material or problems as resolution diminishes with time.



CEE-4803-SLS is one of the core courses in an institute minor program in Global Engineering Leadership (GEL). Georgia Tech's minor track in GEL provides students with in-depth knowledge of leadership theory, skills, experience, and application through a multidisciplinary rigorous program of study. It develops graduates with leadership skills, global awareness/cross-cultural competence skills and problem-solving skills. More information about GEL can be found at: <http://www.ce.gatech.edu/academics/undergraduate/leadership-minor>.

The GEL efforts are aligned with the goal of the Georgia Tech's Quality Enhancement Plan (QEP) to transform educational experience and enhance student learning in a tangible way. Sustainable development is one of the grand challenges facing the engineering community around the world in the 21st century and therefore, there is a great deal of emphasis on the overall theme of sustainability in different areas of the GEL curriculum. This is well-aligned with the QEP's goals to integrate sustainability concepts and community involvement into academic programs and provide opportunities for GT students to learn and serve through engagement with content and context. In particular, students in this course will learn social, environmental, and economic impacts of megaprojects. They also learn about the significance of understanding cultural differences & ethical issues in the development of megaprojects.



This course is part of Georgia Tech's Serve-Learn-Sustain (SLS) initiative, which provides students with opportunities inside and outside the classroom designed to help them combine their academic and career interests with their desire to improve the human condition, allowing them to help build healthier, more sustainable communities where people and nature thrive. More information about SLS can be found at: www.serve-learn-sustain.gatech.edu. Visit the website to sign up for the SLS ListServ and find links to Facebook, Instagram, and Twitter.