



ECE 8070: COMPUTER METHODS FOR POWER SYSTEMS ANALYSIS (PSA)
All Sections (001, 400, 843)

MEETING TIME: Mondays 2.30 pm to 5:00 pm

MEETING LOCATION: Main Campus – Riggs 223
Charleston Campus – Zucker 102

INSTRUCTOR: Dr. G. Kumar Venayagamoorthy
Duke Energy Distinguished Professor of Electrical and Computer Engineering.
Riggs 303D
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Email is the best way to contact me.

OFFICE HOURS: Mondays: 1.30 pm to 2.30 pm by appointment. Please note email is the best way to contact me.

EMAIL COMMUNICATIONS: When you send me an e-mail message, use a descriptive subject line that starts with the course identifier ("ECE8070"). This can significantly reduce the response time of the reply. If you do not receive a response within 48 hours, resend the message. It may have been caught in a spam filter.

COURSE MODALITY: Synchronous (001, 843) and Asynchronous (400)

COURSE PREREQUISITES: Required to have a minimum of C in ECE 4180. The basic requirement is a graduate standing with MATLAB and other programming language skills, Microsoft Office skills (word, presentation, and spreadsheet) and creation of PDF documents.

REQUIRED MATERIALS: Students are required to have a laptop computer, internet connectivity, capable of transmitting and receiving video, a video camera, a microphone, and a cell phone.

REFERENCE MATERIALS: The following texts are recommended for this course contents.

1. Computer Analysis Methods for Power Systems by G. T. Heydt.
2. Computer Techniques in Power System Analysis by M A Pai and D Chatterjee.
3. Computer Techniques and Models in Power Systems by K. Uma Rao.
4. Computer Analysis of Power Systems by J. Arrillaga and C.P. Arnold.
5. Additional material will be handed out in class by the instructor.

COURSE DESCRIPTION: Electric power system operation; development of models of transmission line components and networks; computer methods for solving linear and nonlinear systems of network equations; operating problems in load flow, scheduling and economic dispatch. Students are expected to have completed a course comparable to ECE 4180 before enrolling in this course.

The following content is expected to be covered (time permitting).

- Introduction & Review
- Analysis of Balanced Power Systems
 - Review of admittance and impedance matrices
 - Effect of mutual coupling
 - Matrix techniques for solving network equations
- Applications of Synchrophasors
- Power Flow Analysis
- Analysis of Unbalanced Power Systems
 - Fault analysis
 - Three-phase line and transformer models
 - Three-phase network matrices
 - Three-phase load flow
 - Phase-coordinate fault analysis
- Contingency Analysis
- Scheduling and Optimal Power Dispatch

CLASS CANCELLATION POLICY: Class is cancelled if the instructor is more than 15 minutes late to class.

GRADING:	Participation in class (attendance, discussions, punctuality):	5%
	Tests (two):	30%
	Assignments:	20%
	Project:	20%
	Final Exam:	25%

Above 90% - A; 80 to <90% - B; 65 to < 80% - C; & Below 65% - F.

All disputes about an evaluation of any graded work during the semester must be submitted in writing (typed, not handwritten) within one week after an assignment, test or project has been distributed to students in the class. Any grade challenges must provide specific justifications for why the grade would be changed.

TESTS AND FINAL EXAM: Absence from the tests/final exam will be excused only for medical reasons or serious immediate family problems. A student who anticipates missing these exams for legitimate university or professional activities shall discuss with the instructor at least one week prior and find an alternative to have test taken before the intended date.

ASSIGNMENT/HOMEWORK: All course submissions shall be submitted using Canvas no later than 11.55 pm of the posted due date. No late submissions beyond a day will be accepted. Late submissions require approval of the instructor and may be subjected to a 50% loss of points. Any homework assigned will not be required for submission, but they are mandatory readings. Quizzes and class discussions may be based on homework (missed quizzes will have no make-ups).

MEETING DEADLINES: Plan ahead for the unexpected! You are accountable for staying on schedule should technological or other problems arise. You should immediately contact the instructor if an emergency may affect your ability to meet course deadlines. Do not fall behind. Playing catch-up causes stress, and stress hinders learning.

PROJECT: There will be one semester long project. The project will include a written report (IEEE PES paper format – limited to 8 pages two columns) consisting of the following items:

- Title
- Abstract
- Introduction and motivation to the project topic with references
- Development of applied theory
- Description and implementation of the computer program
- Results and discussions
- Summary

Project Proposal (2 pages) due by September 22nd, 2023

Project Interim (4 pages) due by October 20th, 2023

Project Final Report (8 pages) due by December 1st, 2023

TEST/FINAL EXAM DATES (*tentative days):

***First Test:** September 25th, 2023

***Second Test:** October 30th, 2023

Final Examination: December 14th, 2023 – Thursday – 3– 5.30 pm; if you have any conflict, you need to let me by September 1st, 2023.

ATTENDANCE POLICY: Regular meeting attendance and participation in discussions is expected with attendance taken as iROAR requires entry of student's last date of class attendance. Students are responsible for all material covered and assigned readings and tasks during the semester. If you anticipate not being able to attend a class/meeting for a particular reason, please e-mail me with the information (before the appointment is to be missed). The optimal learning experience depends on both a professional teaching environment and student participation. Absence due to medical reasons will require submission of medical excuse.

Using the Notification of Absence module in Canvas or email to inform the instructor of student absences is required.

ACADEMIC INTEGRITY: The following is Clemson's official statement on academic integrity:

"As members of the Clemson University community, we have inherited Thomas Green Clemson's vision of this institution as a 'high seminary of learning.' Fundamental to this vision is a mutual commitment to truthfulness, honor, and responsibility, without which we cannot earn the trust and respect of others. Furthermore, we recognize that academic dishonesty detracts from the value of a Clemson degree. Therefore, we shall not tolerate lying, cheating, or stealing in any form. In instances where academic standards may have been compromised, Clemson University has a responsibility to respond appropriately and expeditiously to charges of violations of academic integrity."

Plagiarism, which includes the intentional or unintentional copying of language, structure, or ideas of another and attributing the work to one's own efforts. Graded works generated by artificial intelligence or ghostwritten (either paid or free) are expressly forbidden.

For graduate students, see the current [Graduate School Handbook](#) for all policies and procedures.

Each student should read this policy annually to be apprised of this critical information.

COPYRIGHT STATEMENT: Materials in this course are copyrighted. They are intended for use only by students registered and enrolled in this course and only for instructional activities associated with and for the duration of the course. They may not be retained in another medium or disseminated further. They are provided in compliance with the provisions of the Teach Act. Students should be reminded to refer to the Use of Copyrighted Materials and “Fair Use Guidelines” policy in on the Clemson University website for additional information: <https://clemson.libguides.com/copyright>.

ACCESSIBILITY: Clemson University values the diversity of our student body as a strength and a critical component of our dynamic community. Students with disabilities or temporary injuries/conditions may require accommodations due to barriers in the structure of facilities, course design, technology used for curricular purposes, or other campus resources. Students who experience a barrier to full access to this class should let the instructor know and are encouraged to [request accommodations](#) through SAS (Student Accessibility Services) as soon as possible. To request accommodations through SAS, please see this link: (<https://www.clemson.edu/academics/studentaccess/register.html>). You can also reach out to SAS with questions by calling 864-656-6848, visiting SAS at the ASC Suite 239, or stopping by the office as a drop-in appointment.

THE CLEMSON UNIVERSITY TITLE IX STATEMENT REGARDING NON-DISCRIMINATION:

Clemson University is committed to a policy of equal opportunity for all persons and does not discriminate on the basis of race, color, religion, sex, sexual orientation, gender, pregnancy, national origin, age, disability, veteran’s status, genetic information or protected activity in employment, educational programs and activities, admissions and financial aid. This includes a prohibition against sexual harassment and sexual violence as mandated by Title IX of the Education Amendments of 1972. This [Title IX policy](#) is located on the Access and Equity website. Ms. Alesia Smith is the Clemson University Title IX Coordinator, and the Assistant Vice President of Equity Compliance. Her office is located at 223 Brackett Hall, 864-656-3181 and her email address is alesias@clemson.edu. Remember, email is not a fully secured method of communication and should not be used to discuss Title IX issues.

Clemson University aspires to create a diverse community that welcomes people of different races, cultures, ages, genders, sexual orientation, religions, socioeconomic levels, political perspectives, abilities, opinions, values and experiences.

PREFERRED NAME POLICY: Fostering an environment of inclusion is one of the major goals of Clemson University’s new strategic plan, ClemsonForward. Some of the most important elements of inclusion are the ways we interact with one another every day. To help foster interactions that support this goal, Clemson has approved a “Preferred Name Policy”. Simply put, it is now Clemson’s official policy that we all, as members of the Clemson Family, address one another using preferred names (i.e., the name an individual prefers to use even if different from his or her legal name). I therefore request you inform me of your preferred name if different than what I have in my records.

YOUR WELL-BEING IS IMPORTANT:

As a student you may experience a range of personal issues that can impede learning, such as strained relationships, increased anxiety, alcohol/drug concerns, feeling down, sadness, difficulty concentrating, lack of motivation, or

other issues. These mental health concerns may impact your academic performance or your participation in daily activities. It is very important that you ask for help when you are struggling. Please reach out to me or to Clemson's [mental health services](#) to guide you to resources that will help.

EMERGENCY PREPARATION:

Emergency procedures have been posted in all buildings and on all elevators. Students should be reminded to review these procedures for their own safety. All students and employees should be familiar with guidelines from [Clemson University Public Safety](#).

Clemson University is committed to providing a safe campus environment for students, faculty, staff, and visitors. As members of the community, we encourage you to take the following actions to be better prepared in case of an emergency:

1. Familiarize yourself with all possible exits, safer locations, and other key information on the emergency evacuation maps in this building, and those that you visit regularly.
2. Make a plan for how you would Run, Hide, and Fight in case of an [active threat](#) in this building, and those that you visit regularly. For example:
 - a. Run – what are all the possible exits in this building, and the routes to them?
 - b. Hide – what are the potential hiding locations in this room and building that are out of sight of doors and windows, how do you lock the door(s), how would you barricade the door(s) and windows, where do you turn off the lights?
 - c. Fight – What tools are available in this room and building, should you have to fight?
3. Ensure you are signed up for [emergency alerts](#). Alerts are only sent when there is a potential threat to safety, a major disruption to campus services, and once-monthly tests.
4. Download the [Rave Guardian app](#) to your phone. (<https://www.clemson.edu/cusafety/cupd/rave-guardian/>)
5. Learn what you can do to [prepare yourself](#) for the hazards that affect our locations. (<http://www.clemson.edu/cusafety/EmergencyManagement/>).

MODIFICATION STATEMENT: The instructor reserves the right to modify any aspect of the syllabus at any time during the semester for reasons including but not limited to COVID-related situations.

FINAL CONSIDERATIONS:

Learning: At the end of the day, it is how much you have learned from this course that matters. You are advised to be active course participant so that you will receive feedback to assist you with your learning and maximize your throughput.

Agreement: If you disagree with any of the policies or procedures stated above or cannot accommodate the time and work requirements of the course, you need to drop the course as soon as possible. By continuing, you agree to comply with all the policies and procedures described in the course syllabus.

Last Updated August 28th, 2023