

Course Title: Sr. Design & Professionalism II

Course Prefix: ELEG

Course No.: 4248

Section No.: P01/P81

Department of	Electrical and Computer Engineering	College of	Engineering
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Office Hours:	W 10:00am – 11:00am, Thur 11:00am – 12:30pm (Turner)		
Virtual Office Hours:	N/A		
Course Location:	<i>NENGR BLDG Room 137</i>		
Class Meeting Days & Times:	W 10:00-10:50am, R 2:00-4:50pm		
Catalog Description:	ELEG 4482. Senior Design and Professionalism II. (1-3) Credit 2 semester hours. A continuation of ELEG 4472 with required design modifications of the team projects necessary to produce a working prototype of the designs initiated in Senior Design and Professionalism I. Results of the design are presented as project deliverables (oral presentations, written reports, project prototypes). Elements of professionalism reinforce the importance of professional ethics, corporate culture, life-long learning, and globalization.		
Prerequisites:	ELEG 4482 must immediately follow ELEG 4472 or a sequence must restart with ELEG 4472		
Co-requisites:	N/A		
Required Text:	1. "Senior Design Manual" by College of Engineering, Prairie View A&M University		
Recommended Text/Readings:	1. "Fundamentals of Engineering Design," by Barry Hyman, 2 nd Edition, Prentice Hall: 2003 2. "Design for Electrical and Computer Engineering," by Ralph Ford and Chris Coulston, McGraw-Hill: 2005		
Access to Learning Resources:	PVAMU Library: phone: (936) 261-1500 web: http://www.tamu.edu/pvamu/library/ University Bookstore: phone: (936) 261-1990 web: https://www.bkstr.com/Home/10001-10734-1?demoKey=d		

Course Goals or Overview:

To expose the student to the experience of working in a design team, doing project planning, writing design specifications, procurement of parts and acquiring skills and competencies in designing engineering systems and/or processes. Students will acquire effective communication skills by giving presentations to faculty and invited guests. Guest lecturers will be invited to discuss topics relevant to engineering practice, ethics, design, and real world experiences. The student is required in

conjunction with his or her group to submit written reports and give oral presentations throughout the semester.

To give the student the fundamentals of engineering design methodology, and expose them to relevant topics in the field through discussions, lectures and team projects. Each team of students will work closely with faculty advisors knowledgeable in the areas of the project design.

Course Objectives/Outcomes:

Course Outcome 1

To teach students the ability to design and conduct experiments, as well as to analyze and interpret data (*ABET outcome b*).

Performance Criteria/Objectives

1. Ability to design experiments

Given a phenomenon to be experimentally investigated, the students are able to:

1.1 Plan and Understand the phenomenon

Students are able to

- (i) Identify the measurable parameters of the phenomenon
- (ii) Identify the relationship between the phenomenon and the measured parameters
- (iii) Identify different methods and the specific devices for measuring the parameters.

1.2 Select instruments/Design/Assemble Set-up and provide instructions for its use

Students are able to

- (i) Identify and select or design appropriate equipment or components for measuring the parameters and,
- (ii) Provide steps for setting up and conducting the designed experiment.

2. Ability to conduct experiments

Students are able to:

- (i) Demonstrate general lab safety.
- (ii) Follow experimental procedures for the experiment, while maintaining all safety precautions.
- (iii) Demonstrate knowledge of how equipment functions and their limitations.
- (iv) Complete Pre-Lab before coming to the lab when required.
- (v) Collect and record data using appropriate units of measurement and identify the dependent and independent variables in the experiment.

3. Ability to analyze and interpret experimental data

Students are able to:

- (i) Analyze the data to generate the required parameters using appropriate units and significant figures.
- (ii) Use statistical analysis as needed.
- (iii) Present the data (raw/derived) in tabular or graphical form to meet the objectives and to aid in interpretation.
- (iv) Discuss the raw and derived data/graphs and assess the validity of the results.
- (v) Demonstrate the ability to relate how experimental result can be used to improve a process.
- (vi) Draw appropriate or reasonable conclusions.

Course Outcome 2

To teach students to design a system, component, or process to meet desired needs within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability (*ABET outcome c will not be assessed*)

Performance Criteria/Objectives

1. Ability to Define/Understand the Problem and then Plan the Project

Students are able to:

- (i) Identify the customer and the needs.
- (ii) Identify and list the design objectives.
- (i) Identify the design constraints.
- (ii) Define the design strategy and methodology.
- (iii) Identify and break down work into subtasks and identify the personnel & deliverables for each.
- (iv) Develop a Gantt chart and critical path analysis for managing the project.

- (v) Establish major milestones for tracking progress and define performance metrics to measure success.

2. Ability to Conduct a Review of the Literature, Generate Ideas and Apply Creativity

Students are able to:

- (i) Identify the types of information needed for a complete understanding of all aspects of the project (Based on task described in the project planning).
- (ii) Gather information on relevant fundamentals, theory / concept (demonstrate technical competence) and relate them to the design.
- (iii) Provide the sources in a list of references properly cited in the literature review section and relevant sections of the report.
- (iv) Define functional requirements for design (Specific required actions needed to be performed for the design to be achieved).
- (v) Transform functional requirements into candidate solutions / mathematical modeling.
- (vi) Evaluate candidate solutions to arrive at feasible designs.

3. Ability to Perform Preliminary and Detailed Design

Students are able to:

- (i) Identify applicable codes and standards for the design
- (ii) Perform relevant detailed analysis (engineering, mathematical, economic) in accord with applicable codes and standards.
- (iii) Develop final design specifications
- (iv) Do the design within realistic constraints such as economic, environmental, social, political, ethical, health and safety, manufacturability, and sustainability
- (v) Select materials/components/software/test equipment.
- (vi) Fabricate a prototype or a model (physical, software, hardware) of the design.
- (vii) Test or simulate the design and make necessary changes to obtain optimum design.

Course Outcome 3

To teach students the ability to identify, formulate, and solve engineering problems (*ABET outcome e*)

Performance Criteria/Objectives

1. Identify engineering/technical/computing problems

Given a problem, the student is able to:

- (i) Understand the given problem and identify the subject area and concept involved.
- (ii) Convert the problem into a well labeled sketch (such as free body diagram, flow chart, functional block diagram, schematic diagram).
- (iii) Identify the system of units applicable to the problem.

2. Formulate/analyze engineering/technical/computing problems

Given a problem, the student is able to:

- (i) Define the known and the unknown variables in the problem.
- (ii) State relevant laws and equations needed for the problem.
- (iii) List and apply assumptions to the relevant laws and equations to obtain the specific equations appropriate to the problem.

3. Solve engineering/technical/computing problems

Given a problem, the student is able to:

- (i) Implement strategy to solve the problem.
- (ii) Solve the problem (showing consistent units throughout).
- (iii) Evaluate and interpret the result.

Course Outcome 4

To teach students to function in a multidisciplinary design team (*ABET outcome d will be assessed*)

Performance Criteria/Objectives

1. Manage themselves as a team by following good team management practices and resolve conflicts

- (i) Plan group meetings and time management, assign team roles (leader, recorder, etc).
- (ii) Assign and keep good record of team meetings and activities.
- (iii) Distribute project tasks evenly to team members, and evaluate performance of team members on a regular basis.

- (iv) Resolve conflicts professionally within the group (*Example will be an assignment to identify potential problems and indicate how they will resolve them*).

2. Track and meet project schedule

- (i) Track progress of team members to ensure project is on schedule (through submission of progress reports).
- (ii) Share ideas, complete assigned task on time, help others, and be professional to each other (through peer evaluation of team members on these characteristics).

Course Outcome 5

Understanding of professional and ethical responsibility (ABET outcome (f) will be assessed)

Performance Criteria/Objectives

1. Students understand and demonstrate ethical responsibilities

- (i) Students are able to demonstrate the knowledge of professional code of ethics (*Review code of ethics from your specific professional society and from your State board of professional Engineers. Students may be tested on these*).
- (ii) Students are able to evaluate case studies and make ethical decisions (*Instructor may present a case study and request students to identify and provide professional and ethical considerations for addressing the problem posed in the case study*).
- (iii) Students acknowledge the work of others they use through proper permission and citation.
- (iv) Students apply ethics in the academic environment and desist from cheating, plagiarism, and report such unethical practices to proper authorities.

2. Students understand and demonstrate professional responsibilities

- (i) Apply professional standards (use of handbooks, codes, standards) in obtaining, reporting, analyzing data or in design.
- (ii) Attend classes on regular basis and informs professor when excused absence situation occurs (use attendance policy and the professionalism of students in informing and getting excuse for being absent).
- (iii) Students demonstrate high academic standards, personal responsibilities (continually looks for own mistakes and opportunities/methods for improvement), and exercises good judgment and discretion (make decisions based upon a defined body of acquired knowledge).

Course Outcome 6

Student becomes proficient in written, oral and technical communication (*ABET outcome g*)

Performance Criteria/Objectives

Oral Communication

1. Ability to Organize, Plan, Design/Prepare and Use Appropriate Visual Aids for communication/Presentation

- (i) Students are able to organize presentation in well structured logical sequence making it easy for audience to follow the content with clear understanding.
- (ii) Students are able to prepare effective slides (*adequate and relevant technical content and viewgraphs that are legible, completely labeled/annotated/dimensioned to illustrate important features of the work being presented*).
- (iii) Students are able to use modern presentation techniques (*may include visually enhanced transitions, animations, video, and sound clips*).
- (iv) Students are able to stay within time limits

2. Ability to Articulate Subject Knowledge (Technical Content)

- (i) Students demonstrate knowledge and understanding of the subject. (*This may be demonstrated by presenting literature review, originality, creativity, required standards, constraints, and other appropriate considerations such as economics, environmental, and societal impact*)
- (ii) Students are able to prepare and display prototypes or models when they are necessary to support the presentation.
- (iii) Students respond clearly to questions in a professional manner after restating questions to audience.

3. Appearance and Ability to Provide Good Oral Delivery

Students are able to:

- (i) Use correct grammatical English and technical terms appropriate to technical area and audience; speak with clarity and confidence.
- (ii) Maintain good posture and eye contact with the audience (should not read from prepared notes) and elicit the attention of the audience.
- (iii) Dress appropriately for the occasion.

Instructor may record the presentation for assessment display purpose, and must ensure to get consent for witness protection from the students.

Written Communication (Senior Project Report Writing)

4. Ability to organize, plan and properly format a written technical report

- (i) Students are able to organize report by categorizing ideas for the report into well and logically organized chapters, major sections, subsections and paragraphs blended within the larger units.
- (ii) Students provide Title Page, Abstract, and Table of Contents, list of Figures, and List of Tables properly formatted.
- (iii) Students provide figure number and title for each figure in the report, reference each figure, and completely discuss each figure in the report in accord with standards in the project manual.
- (iv) Students provide table number and title for each table in the report in accord with standards in the project manual, reference each table, and completely discuss each table in the report.
- (v) Students properly cite references in the report and provide well formatted reference list at the end.
- (vi) Students prepare the written report in accord with standard report formatting provided in the Senior Projects Report Manual.

5. Ability to compose original texts and properly apply the conventions of written language.

Students are able to

- (i) Properly apply capitalization, punctuation, and penmanship, to communicate clearly
- (ii) Spell proficiently
- (iii) Apply standard grammar and usage to communicate clearly and effectively in writing including
 - using complete sentences, varying the types such as compound and complex to match meanings and purposes
 - properly employing standard English usage in writing for audiences, including subject-verb agreement, pronoun referents, and parts of speech
 - properly using adjectives (comparative and superlative forms) and adverbs appropriately to make writing vivid or precise
 - properly using prepositional phrases to elaborate written ideas
 - properly using conjunctions to connect ideas meaningfully
- (iv) Use available technology to support aspects of creating, revising, editing, spell checking, and publishing the report.

6. Ability to provide appropriate discussion, conclusions and recommendations

Students are able to clearly

- (i) Summarize the goals, objectives, and indicate whether they were met.
- (ii) Summarize the results.
- (iii) Summarize constraints and codes and indicate whether they were met.
- (iv) Provide logical conclusions and recommendations (including strengths and weaknesses).

Course Outcome 7

The broad education necessary to understand the impact of engineering solution in a global and societal context (*ABET outcome h*)

Performance Criteria/Objectives

Students are able to investigate a given engineering problem and are able to analyze the short and long term impact (political, economic, environmental, health, safety, cultural) of proposed solutions on society (local, regional or global context).

- *Instructor poses a problem (case study), and asks students to propose solution and indicate how proposed solution will impact society*
- *Instructor poses a problem, provides solutions, and asks students to analyze solutions and determine their impact on society.*

- *Students working on projects are required to analyze and determine the effects of their proposed solution on society*

Course Outcome 8

A recognition of the need for, and ability to engage in life long learning (*ABET outcome i*).

Performance Criteria/Objectives

1. Students are aware of the need for lifelong learning

- (i) Given an open ended problem, students are aware of the need and are able to independently acquire additional knowledge and data needed for solving the problem. (*Instructor may give an assignment that requires students to learn additional information not covered in class for successful completion of the assignment*).
- (ii) Students join and participate in activities of local student chapters of professional or other organizations and are aware of or make use of programs provided by the professional organizations in the areas of training and continuing education.

2. Students engage in life-long learning activities

- (i) Students are able to effectively use library and online resources for research and are abreast with current developments in their discipline. (*Instructor can give an assignment requiring students to use other resources to study on their own and use the information studied to solve the problem, or give a library assignment*)
- (ii) Students are able to identify and take advantage of learning opportunities available on internet and elsewhere such as seminars, webinars, conferences, workshops and tutorials. (*The instructor should direct the students to identify some of these activities and require them to show documentation of their involvement*).

Course Outcome 9

A recognition of contemporary issues (*ABET outcome j*)

Performance Criteria/Objectives

1. Students display knowledge in a variety of contemporary issues or topics

- (i) Students are able to identify current issues (socio-economic, political, environmental, cultural, health and safety) in engineering and technology. *Some examples are global warming, population, depletion of natural resources, alternative energy; outsourcing, security, ecology, engineering/technology workforce development, human rights and environmental pollution.*
- (ii) Students are aware of contemporary issues in industry such as corporate culture, industry-academia-government collaboration, industrial competition, etc.

Instructor may require the student to identify and discuss several of the contemporary issues; recognize consequences; take and defend a position and/or write a report.

Instructor may assign topics or issues and require the students to discuss these issues; recognize consequences; take and defend a position and/or write a report.

Course Outcome 10

Use of techniques, skills, and modern engineering tools to complete a final design project (*ABET outcome k* will not be assessed)

Performance Criteria/Objectives

1. Students are able to use techniques and skills acquired in their studies necessary for engineering practice.

- (i) Students are able to utilize the latest problem solving and design techniques/methods in their discipline (such as unified modeling language (UML), numerical techniques, process simulators, and the design process).

2. Students are able to use modern engineering tools necessary for engineering practice

- (i) Students are able to solve problems using current software used in the discipline (such as Matlab, AutoCAD, EES, Ansys, Multisim, Pspice, .NET, C++ compiler, etc)
- (ii) Students are able to utilize the latest available hardware/equipment used in the discipline (such as NC machine, signal generators, oscilloscope, strength testing machine, computer hardware)

Course Requirements & Evaluation Methods

This course will utilize the following instruments to determine student grades and proficiency of the learning outcomes for the course.

Class Participation - daily attendance and participation in class discussions; attend guest speaker talks.

Outside Class Participation - Field visits, 'Short call' late afternoon or evening sessions, Weekly team work, Pre-scheduled weekend team work; Utilization of campus computing resources.

Initiative - Personal and team initiative to keep track of project needs, develop relationship with team members and leaders, start and complete project tasks on schedule and meet deadlines.

Leadership - Execute leadership roles as need be to complete task, maintain regular correspondence with team members and troubleshoot scenarios with Instructor's help. Keep track of Deadlines.

Professionalism and Ethics - The Sr. Design Course is a mock run of what the graduates will expect in the industry. Professionalism and ethics in getting work done on time through communication and teamwork is vital for ultimate success in ELEG 4482.

Teamwork - Develop and maintain solid teamwork mindset; show enthusiasm and be positive to changes and deadlines.

Communication - Be alert to the needs of the group. Communicate individual needs to the team leader and/or team manager, as appropriate under the protocols discussed in class by the Instructor.

Quality Control – Practice clear documentation of computer and hand calculations, generate clean, crisp, to-the-point reports, presentation slides, assignments, AutoCAD drawings, and project model.

Grading Matrix

Numerical score	Letter grade
90 or more	A
80-89	B
70-79	C
60-69	D
Less than 60	F
<u>Grading Summary</u>	
Attendance, Punctuality, Mid Term Team Project Status Papers/Presentations/Reports	10%
Final Oral Presentation	30%
Final Written Presentation	30%
Quality/Demonstrate a Working Final Design	30%

Grade Determination:

A: 90 – 100%

B: 80 – 90%

C: 70 – 79%

D: 60 – 69%

F: 0 – 59%

Submission of Assignments:

Follow the instructors' requirements.

Formatting Documents:

Microsoft Word is the standard word processing tool used at PVAMU. Please use "Times New Roman" style with Font 12 and 1.5 line spacing. Microsoft Excel 2007 should be used for all spreadsheet calculations. Legible hand calculations with necessary sketches must support Excel spreadsheet. Spreadsheet must contain list of assumptions (if any), and all equations used in respective columns.

NOTES:

- No Cell phones in the Classroom, They must be turned off while in the classroom or in an emergency you should keep it in silence (vibration) mode. It is a distraction for other students and faculty.
- **Students will be required to work at hours beyond the set time because of the nature of this course.**
- **Weekly report will be true to accomplishments and setbacks.**
- **PowerPoint slides will have to dynamic with animation. Details will be discussed.**
- **Professional caliber blue prints with scales are expected.**
- Students with disabilities, who believe they may need an adjustment in this class, are encouraged to contact the Office of Disabilities Services at (936) 261-3581/3582 as soon as possible. Once you receive a letter of adjustment from the office, kindly make an appointment with me to discuss appropriate adjustments for this class.
- Grading/class related Appeals (see undergraduate catalog)

REMOVAL OF TEAM MEMBER:

In the event that it becomes necessary to remove a member from a team, the following procedure must be followed:

1. The team minus the affected member must meet to discuss the action to be taken.
2. The team must then meet with the affected student and discuss the action to be taken.
3. A letter must be submitted to the instructor giving justification for the action to be taken. The letter must be signed by all team members and a copy must be sent to the affected student.
4. The instructor will then schedule a meeting with the team members and the affected student for final discussion and appropriate action.

UTILIZATION OF CLASS TIME

Wednesday 10:00am – 10:50am – Meeting and discussions with course instructors

Thursday 1:00pm – 4:50 pm: Lecture, Workshops, Presentations, Team Meetings, Other Issues
Team collaboration/communication to stay focused and on track for timely completion of tasks.

TOPICS TO BE COVERED

REVIEW OF THE DESIGN PROCESS

- Review of the Design Process
- Review of Comments from Project I Final Report

PROJECT PLANNING FOR SEMESTER

- Planning Concepts, Tasks and GANTT Charts

DETAILED DESIGN COMPONENTS AND SUBSYSTEMS TESTING

- Testing of Components for Functionality & Efficiency
- Modification of Design for Improvement
- Re-Testing of New Designs

MODERN ENGINEERING TOOLS & PRACTICES

APPLICATION OF CODES & STANDARDS

PROFESSIONALISM & ETHICS

GLOBAL & SOCIAL CONSIDERATIONS