Course Syllabus

ELCT 403 – Capstone Design Project I

Course Coordinator: Undergraduate Program Committee

Catalog Description: Capstone design project: planning and preliminary design (2 semester sequence)

Credit Hours 3 (42 contact hours)

Prerequisite(s) by course ELCT 302

Prerequisite by topics In penultimate semester prior to graduation, or consent of instructor

Required Textbook Pocket Book of Technical Writing for Scientists and Engineers

Other Materials Class notes posted on Blackboard

Course Outcomes:
Students who are successful in this class (i.e. earn C or better) will demonstrate at least the abilities to:

- Develop system requirements from top-level customer requirements.
- Analyze and compare design alternatives, at the system and subsystem levels, and use measures of performance or other criteria to rank alternatives.
- Plan and organize an engineering design project using tools such as Gantt charts to develop a work breakdown structure, develop a schedule including milestones, and estimate effort and costs.
- Develop a design concept and elaborate it through to a detailed design by decomposing a system concept into component subsystems, identifying the subsystem requirements, and defining interfaces between the subsystems.
- Build prototypes of key subsystems.
- Design appropriate tests to measure and evaluate the performance of prototype subsystems to determine whether they meet performance and interface requirements and recommend changes where they do not.
- Constructively contribute to the accomplishments of a multidisciplinary team, including critical evaluation of self and team-member performance.
- Communicate the team's logistical and technical approaches to the design project in a polished, co-authored, written proposal, using language and graphics appropriate to the technical discipline.
- Succinctly report individual and team performance against the plan.
- Describe organizational and technical plans and progress in oral presentations, using high-quality, informative, graphical and textual elements.

Students who demonstrate higher proficiency will earn higher grades.

Course Topics:
- Analysis and specification of system and subsystem requirements
- Analysis of alternatives
- Measures of performance
- Effective design strategies, brainstorming, collaboration
- Intellectual property
- Project management and scheduling, Gantt chart, MS Project
- Oral presentation skills, effective graphics in presentations
- System characterization, design of qualification tests
- Methods for effective and efficient collaborative development and revision of documents
• Effective teamwork, team expectations, team member evaluation

Course Contribution to Program Outcomes:
ELCT 403 contributes to an achievement of:

• Outcome A – an ability to apply knowledge of mathematics, science and engineering
• Outcome B -- an ability to design and conduct experiments, as well as to analyze and interpret data
• Outcome C -- an ability 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
• Outcome D -- an ability to function on multidisciplinary teams
• Outcome E -- an ability to identify, formulate, and solve engineering problems
• Outcome G – an ability to communicate effectively
• Outcome I – a recognition of the need for, and an ability to engage in life-long learning
• Outcome K – an ability to use the techniques, skills, and modern engineering tools necessary for engineering practice

General Course Policies

Academic Integrity
This is a team-oriented class so you are expected to build on the work of others. Nonetheless, individual contributions should not be obfuscated and external sources of ideas should be recognized and credited. Every team member is expected to contribute in some substantial way to every team assignment. But every individual assignment should predominantly be the work of that individual; contributions of others should be recognized appropriately, perhaps in an Acknowledgements section. All students are expected to follow the University of South Carolina Honor Code and should expect that every instance of a suspected violation will be reported. Students found responsible for violations of the Code will be subject to academic penalties under the Code in addition to whatever disciplinary sanctions are applied.

Accommodating Disabilities
Reasonable accommodations are available for any student with a documented disability. If you have a disability and may need accommodations to fully participate in this class, contact the Office of Student Disability Services: 777-6142, TDD 777-6744, email sasds@mailbox.sc.edu, or stop by LeConte College Room 112A. All accommodations must be approved through the Office of Student Disability Services.

Diversity
In developing the semester schedule, we have attempted to avoid conflicts with major religious holidays. If, however, we have inadvertently scheduled an event that creates a conflict with your religious observances, please let the instructor know as soon as possible so that other arrangements can be made.

Amending the Syllabus/Rules
Amendments and changes to the syllabus, including evaluation and grading mechanisms, are possible. The instructor will initiate any such changes, considering input from the class.
ELCT 403 – Capstone Design Project I

Fall 2015

Instructor: Dr. Roger Dougal
Office: Swearingen 3A79
E-mail: dougal@cec.sc.edu
Phone: 803.777.7653
Office hours: by appt, 8 AM–6 PM
Class Location: Swearingen 2A19
Teaching Assistant: Dan Bauer bauerdl@email.sc.edu
Class Meeting Time: 2:50 Tue
Lab Help Hours: Th 3:00-5:00

Course Delivery Structure:
Weekly lectures, group project, open lab hours, interactive lab hours

Course Assessment
All assignments and grades are based on individual submissions unless indicated as “team”.

<table>
<thead>
<tr>
<th>Assignment</th>
<th>Percentage</th>
<th>Team</th>
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<tbody>
<tr>
<td>System requirements report</td>
<td>5%</td>
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<tr>
<td>Analysis of Alternatives report</td>
<td>10%</td>
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<tr>
<td>Work breakdown structure – MS Project file</td>
<td>10%</td>
<td>team</td>
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<tr>
<td>Subsystem requirements and interfaces report</td>
<td>10%</td>
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<tr>
<td>Proposal</td>
<td>10%</td>
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<tr>
<td>Critical subsystem prototype characterization report</td>
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<tr>
<td>Critical subsystem prototype demonstration</td>
<td>10%</td>
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<tr>
<td>End of term Oral presentation</td>
<td>10%</td>
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<tr>
<td>Monthly status reports</td>
<td>5%</td>
<td></td>
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<tr>
<td>Monthly notebook snapshots</td>
<td>10%</td>
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<tr>
<td>Peer- and self-evaluations</td>
<td>10%</td>
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<tr>
<td>Participation</td>
<td>(up to – 20%)</td>
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<tr>
<td>Total Score</td>
<td>100</td>
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Rubrics will be used to grade all assignments and the rubrics will be visible in Blackboard prior to the due date of the assignment. Numerical values of semester grades will be converted to letter grades using this scale:

- A 90 – 100
- B 80-86, B+ 86-90
- C 70-76, C+ 76-80
- D 60-66, D+ 66-70
- F less than 60

Course Outline/Schedule
Below is the general schedule. The more detailed calendar and due dates for all assignments are posted on BlackBoard. Any changes in the schedule or due dates will be indicated on Blackboard.

<table>
<thead>
<tr>
<th>Course Schedule</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Course overview, goals, expectations, project options, reading assignment</td>
<td>Week 1</td>
</tr>
<tr>
<td>Analysis of requirements, analysis of alternatives, measures of performance</td>
<td>Week 2</td>
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<tr>
<td>Week</td>
<td>Topic</td>
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<tr>
<td>3</td>
<td>Project management, scheduling, Gantt chart, MS Project, writing an abstract</td>
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<tr>
<td>4</td>
<td>Partitioning a system, defining interfaces, writing a proposal</td>
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<td>5</td>
<td>Preliminary design review, patent and literature searches</td>
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<td>6</td>
<td>Writing a status or progress report</td>
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<tr>
<td>7</td>
<td>Team performance, peer expectations, peer review</td>
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<tr>
<td>8</td>
<td>Designing tests to characterize a subsystem, writing characterization report (Ch 9)</td>
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<tr>
<td>9</td>
<td>Graphics and visual elements in tech communications (Ch 15), conveying competency, grammar, style, punctuation (Ch 13)</td>
</tr>
<tr>
<td>10</td>
<td>Intellectual Property disclosures, patents, copyrights, etc. Tech definitions and writing (Ch 3, 4, 5)</td>
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<tr>
<td>11</td>
<td>Employee and peer evaluations and references, business communications (Ch 18)</td>
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<tr>
<td>12</td>
<td>Preparing a good final presentation (Ch15, 17)</td>
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<tr>
<td>13</td>
<td>Resolving problems. Extemporaneous problem descriptions</td>
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<tr>
<td>14</td>
<td>Avoiding recalls: failure modes and effects analysis, system safety, reliability, product liability, ethics</td>
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<tr>
<td>15</td>
<td>End of term presentations and demonstrations</td>
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</tbody>
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**Course Policies**

**Attendance Policy**
The university policy on course attendance will be enforced. You should attend every class except with an approved excuse. Excessive absences may incur a grade penalty. Class absences (among other things) will affect your participation grade.

**Participation Policy**
Substantial, and substantially-equal, participation is expected from every team and from every class member. The participation requirement applies whether or not the instructor or TA are present. Speak up in team meetings, speak up in class, participate in discussions, ask questions, do your research, analyze problems, talk to your project sponsor, be inquisitive, try things, seek answers, seek solutions, *contribute*. According to the grading formula, failure to fully participate will subtract from your earned semester average.

**Expectations for Classroom Behavior**
Please be respectful of each other, the instructor, and others in class and in lab. We are all here to learn! Any disrespectful or disruptive behavior may result in referral to the Office of Student Judicial Programs.

**Assignment Submission**
All written assignments and presentation files will be submitted via BlackBoard in PDF format. Assignments are generally due at midnight on the due date. Any exception will be noted on Blackboard. If you are not familiar with Blackboard, you should plan to submit your assignments well before the deadline in case you encounter technical difficulties. Late assignments will generally be penalized, except in the case of failures of the Blackboard system itself.

**Expectations of the Instructor**
The instructor is expected to facilitate learning, to answer questions appropriately, to be fair and objective in grading, to provide timely and useful feedback on assignments, to maintain adequate office hours, and to treat students as he would like to be treated in their place.