Electrical and Computer Engineering

Capstone Design Projects Booklet

Academic Year 2015-16

Last updated: January 2016
Version: 03

Electrical and Computer Engineering Department
Rutgers University, Piscataway, NJ 08854

1. Introduction

The capstone design projects spans over a single semester, taking place in the spring. The purpose of this booklet is to provide students and advisors with general guidelines, dates, deadlines and deliverable requirements for the capstone design project course.

2. Getting ready for capstone design projects

2.1 Course Registration

In the spring semester each approved advisor within the ECE department is assigned a capstone design course number in the form 14:332:448:XX (UNIT:SUB:CRSE: SECT), where SECT represent a section number unique to each advisor. Capstone teams need to be signed up to their advisor capstone project course. The ECE undergraduate Director, Dr. Marsic, will sent each advisor their section number and a set of special permission numbers in the fall semester. The project advisor should assign each team with a set of special permission numbers, one for each of the team members. These permission numbers should be sent by the advisor to the team point of contact (POC) to be distributed among the members.

Advisors that are not within the ECE department will be assigned an ECE faculty as a POC to assist with project coordination within the ECE department. The ECE faculty will provide the students with a capstone course number and special permission numbers for registration.

With any questions regarding registration please contact Dr. Marsic (marsic@jove.rutgers.edu).

2.2 Checklist for the first week of the semester:

a. [Team POC] Please update the Sakai site 'Capstone 2015-16' assignment 'TEAM UP' with the latest updated information as for: Team members, their emails, advisor, and project title. Only the POC should be uploading this information.

b. [Team POC] Please check the projects list file uploaded on Sakai under 'Resources\Capstone Info\' and email Dr. Godrich (godrich@rci.rutgers.edu) with any

issues or updates (please make sure the assignment 'TEAM UP' is updates accordingly as well).

c. [Team POC] please fill up the 'Capstone Project Proposal' (available under 'Resources') and upload a digital copy of the document under the assignment 'TEAM UP' and the POC Dropbox folder.

d. [Advisors] Please provide your students with individual special permission numbers and course section information for registration.

3. Capstone project timeline and guidelines

This section provides an overview of the general timeline for the spring semester and general guidelines as for students and advisors responsibilities and roles.

3.1 Capstone projects timeline

Please mark down the following important dates and deadlines for spring 2016 semester:

- **February 22, 2016**: <u>Project abstract</u> to be submitted to the advisor by the team POC

- Week of **February 22, 2016**: <u>Project presentations session I</u> will be held during this week. Times and dates will be published on Sakai and via emails.

- **March 18, 2016**: <u>Interim report</u> to be submitted to the advisor by the team POC

- Week of **March 28, 2016**: <u>Project presentations session II</u> will be held during this week. Times and dates will be published on Sakai and via emails.

- **April 15, 2016**: <u>Final report</u> draft to be submitted to the advisor for approval

- **April 15, 2016**: <u>Project poster</u> draft to be submitted to the advisor for approval

- **April 22, 2016**: final revision of approved <u>Project poster</u> to be uploaded on the Sakai site

- **April 27, 2016**: <u>Poster Day/ Capstone Expo</u>. A project competition will be held and team members are required to be on site for the presentation.

- **May 2, 2016**: <u>Final report</u> final revision approved by the advisor to be uploaded on the Sakai site by

- **May 2, 2016**: <u>A 60 seconds video</u> to be uploaded on the Sakai site.

- **May 2, 2016**: <u>Exit survey for seniors</u> to be submitted on the Sakai site.

- **May 4, 2016**: deadline for submission of capstone course grades by the advisors and submission of exit survey by the students

3.2 Students responsibilities

Capstone design team members have full responsibility and ownership for their capstone project. A POC needs to be selected for each team. The POC is responsible to making all communication with the advisor and the department. He/she are not responsible for the project, the responsibility for the project executions is equally split between all group members. Team members should decide in the first week what is the role each member takes in the project, both technical and administrative, and share this information with the advisor. Please make sure all are taking a fair share of the project load. Students are responsible, among others, for:

- Reviewing and understanding the project timelines, milestones and deliverables.

- Signing up to the advisor capstone course.

- Coordinating and agreeing with the advisor on the project scope of work (SOW) and deliverables.

- Managing tasks, project milestone, budgeting and purchases for the project.

- Tracking project progress and making sure the team is on schedule.

- Setting time to meet periodically with all team members and with the team advisor.

- Keeping the advisor informed in a timely fashion with the project progress and any roadblocks.

- Keeping the department informed with any issues that require the department attentions or assistance.

- Preparing the required material for project presentations and getting advisor feedback in advance.

- Working on the project in a consistent fashion and allocating an appropriate amount of time for its execution.

- Delivering any reports, poster, presentation and other project deliverables on time.

- Being responsive to the advisor and department communication and requests.

- Participate in Poster Day and all presentations.

Students will be graded individually for their performance in the capstone design project. Remember, every team member has full responsibility to the team's success.

3.3 Capstone advisor role

Capstone design project advisors are required to supervise the planning and progress of the project and the team. The advisor needs to

- Assist the students with defining the project scope of work

- Provide students with registration information

- Provide the student with feedback on proposed project solutions and purchases

- Meet with the students on a regular basis to review their progress

- Be available to the students in person or via email to support the students with problem solving if needed

- Review the proposal, abstract, presentations, poster and reports and verify compliance with department requirement as detailed in this booklet and in the report guide

- Attend capstone presentations

- Grade the students (individual grading)

4. Getting started

Capstone design project duration is around three months. The project process is divided herein into three main phases, each corresponding to a time period of a month, leading up to the final

project submission in the end of the spring semester. These phases are separated by the presentation days, which define mid-project millstones while the last millstone is the poster day presentation. The objective and deliverables of each phase are as follows:

a. **Phase I**: getting organized with a final project SOW, individual team members responsibilities allocation, project design objectives and constraints, and project plan, cost, and deliverables.

    Project deliverables: SOW will be presented in the first round of presentation during the week of February 22, 2016.

b. **Phase II**: project design and development, including modeling, simulation, prototyping, and any required purchases (if not done in phase I).

    Project deliverables: project progress will be reported in the interim report on March 18, 2016, and presented in the second round of presentation during the week of March 21, 2016.

c. **Phase III**: prototype debugging and project finalization.

    Project deliverables: final report, poster and 60-seconds video should be submitted by the 4th week of April 2016.

4.1 Lab space and training

The ECE department will allocate laboratory space per project needs. The team POC should contact Mr. Steve Orbine (orbine@ece.rutgers.edu) within the first two weeks of the semester to let him know if a lab space is required for the project. A lab a time slots will be allocated according to the needs and availability.

Students that need to work in a lab might need to attend safety training sessions. These will be held in the first four weeks of the spring semester. Please follow announcement on Sakai as for training session scheduling. Please contact Mr. Steve Orbine with any questions regarding lab use and training.

4.2 Project budget and funding

The ECE department allocates a budget of $300 per capstone project. Prior to making any purchases, the capstone advisor needs to approve them. Before ordering, please check with and Mr. Steve Orbine (orbine@ece.rutgers.edu) if any of the required items are available in the ECE labs for general use.

Capstone teams looking for external funding, please contact Dr. Godrich (godrich@rci.rutgers.edu) with any question related to getting the funding processed through the department and other opportunities.

One team member should make all purchases for the project. Once purchases have been made a Taber form should be filled and handed in to Ms. Tea Akins (ta331@rci.rutgers.edu , ECE building room 120). The Taber form and filing instructions are available on Sakai under the Resources tab. Please make sure you follow the Taber filing instruction included in 'Taber Instructions.pdf' file. Accounting needs original receipts with every purchase. If bought in store, please attach the original receipt with the last digits of credit card # or credit card name on it and if paid in cash it should say "Cash". When buying online, a confirmation receipt with the same cc # and name is needed. PayPal confirmation receipt is also accepted. Tabers must have both the student signature and the Professor's signature (originals) on it. The description should indicate that the purchases are for a capstone project and include the capstone project number and the capstone course number and section.

Important: university regulations require that expense must be processed within 60 days of the date on which the expense was incurred. **Please make sure to file a Taber for expenses monthly to make sure you can get reimbursed**. More than one Taber can be filed if necessary.

4.3 Project presentation sessions I & II:

During the week of February 22 and the week of March 21 the department will hold several project presentation sessions. The team POC needs to coordinate with the project advisor and sign up to one of these sessions. Students participation is mandatory and will be reported back to the advisor. The students need to attend the full presentation session.

Each team will have 7 minutes for the presentation and 3 minutes for Q&A. A deck of slides of up to 5 slides should be prepared and uploaded on the capstone course Sakai site under the POC Dropbox folder a day before the presentation. First page of the presentation should include the project title, project number, team member names, and adviser name. The presentation for February should provide a short technical overview with discussion on existing solutions or similar work (when relevant), review of the proposed project and its objectives, design approach and challenges, project tasks and milestone and work load distribution among the team members. The presentation for March should be n the form of a progress report – picking up for the point where the first session left. It should include information on the project progress, implementation, performance, challenges, project tasks and milestone and updated cost evaluation.

4.4 Checklist for Phase I:

The project team needs to:

- Make sure the team meets periodically and works towards project deliverables. The first month of the semester is when most students have more available time.

- Set periodic meetings for the team with the project advisor.

- Make sure the bill of material (BOM) is ready on time and the budget is approved before moving forward with purchases.

General deliverables: project presentation session I

4.5 Checklist for Phase II:

The project team needs to:

- Make sure any required material is available and there are no bottlenecks that might result from ordering schedule.

- Make sure the team in on schedule with tasks and millstones.

- Keep the advisor updated with any issues and delays with project execution.

General deliverables: interim report and project presentation session II.

4.6 Checklist for Phase III:

Special attention needs to be given in this phase to the project report. There are ABET requirement with respect to this report. Both students and advisors need to work together to make sure the report is compliant with these requirements.

The project report template includes detailed information on what needs to be addressed in each section. Please refer to the template (available on the Sakai site under the Resources tab) for guidelines. Some important topics that need to be covered in the report are:

- List of relevant standards used in the project

- Detailed cost analysis of the project prototype (when relevant), work invested, time, resources, software platform, services etc.

- Sustainability aspects of the project

- Inclusion of a detailed references list

- Copyright violation - make sure that the students have generated any figures used in the report.

General deliverables: project report, poster, 60-seconds video, and presentation on Poster Day. In the last few weeks of the semester Dr. Marsic will send an exit survey to all students. This survey needs to be filled up by all students and returned to Dr. Marsic before grades can be released.

5. Capstone project grading

The advisor is grading the students' performance on the team. ECE advisor should upload grades directly and others should send the grade to the POC within the ECE department that will coordinate the grade submissions. The grades are not a group grade but and individual one.

The advisor should clearly communicate to the student within the first two weeks with his/her expectations of the project in terms of quality and deliverables. Grading policy and criteria that will be applied for grading should be detailed as well. These criteria should be specific.

Remember that amount of work students need to put into their project should be the equivalent of 3 credit coursework and that the students will receive a letter grade on their transcript.

Appendix A: Capstone design project registration info

An example of the document titled 'Special Permission Number Assignments', that was sent by Dr. Marsic in the previous semester includes the individual section number and 12 special permission numbers.

```
E91C550                     R U T G E R S ,   T H E   S T A T E   U N I V E R S I T Y
                                          10/14/14

                              SPECIAL PERMISSION NUMBER ASSIGNMENTS            INITIAL RUN

          14    332   448          ▬      CAPSTONE DESIGN ECE    17261  SPRING  2015        010
    REGISTRAR  UNIT   SUB   CRSE   SUPP  SECT  COURSE TITLE      INDEX  SEMESTER         STOP POINT

    SPECIAL PERMISSION NUMBERS             STUDENT NAME

              037012    _____

              086762    _____

              108190    _____

              286560    _____

              302386    _____

              303671    _____

              399536    _____

              424157    _____

              687435    _____

              702158    _____

              783957    _____

              864312    _____


    CONTACT SCHEDULING OFFICE FOR ADDITIONAL NUMBERS


                                      MEETING TIMES

        DAY     PERIOD    START TIME    END TIME    BLDG    ROOM    CAMPUS
```

Appendix B: Capstone project proposal document

School of Engineering

Department of Electrical and Computer Engineering

Capstone Project Proposal

Project Number:

Project Title:

Project term: Spring 2016

Student names (last and first name) and contact information (please start with the team point of contact):

1.

2.

3.

4.

Project Advisor(s) name(s):

1.

2.

Appendix B: Capstone project proposal document (cont. P2)

School of Engineering

Department of Electrical and Computer Engineering

Capstone Project Proposal

Team number:

Title:

This section should include a one page (max) description of the project.