



Capstone and Faculty Mentors/Advisors/Coaches

Dr. Gene Dixon, East Carolina University

Gene Dixon is a tenured Associate Professor at East Carolina where he teaches aspiring engineers at the undergraduate level. Previously he has held positions with Union Carbide, Chicago Bridge & Iron, E.I. DuPont & deNemours, Westinghouse Electric, CBS, Viacom and Washington Group. His work experience includes project engineer, program assessor, senior shift manager, TQM coach, and production reactor outage planner, remediation engineer. He gives presentations as a corporate trainer, a teacher, and a motivational speaker. He received a Ph.D. in Industrial and Systems Engineering and Engineering Management from The University of Alabama in Huntsville, a Masters of Business Administration from Nova Southeastern University and a Bachelor of Science in Materials Engineering from Auburn University. He has authored several articles on follower component of leadership and is active in research concerning capstone, engineering education, and leadership processes. He has served as newsletter editor/secretary, program chair, division chair and awards chair in both the Engineering Management and Engineering Economy Divisions of ASEE. He is a fellow of the American Society of Engineering Management and serves as the 2015 ASEM President. Dixon also serves on the Eugene L. Grant Award Committee for the Engineering Economy Division of ASEE. He is a board member of the ASEE Design in Engineering Education Division and Secretary for the ASEE Industrial Engineering Division.

Capstone and Faculty Mentors

Abstract

A standardized process of advising, coaching and/or mentoring may result in consistent capstone project results all other variables being equal. This paper describes the background of developing a faculty advisor guide and includes a beta-version of a faculty handbook for a general engineering undergraduate program.

Introduction

Paliwal and Sepahpour¹ suggest that the capstone process causes students to think about engineering, technology, society, the world around them and themselves. According to Paretti, et al.², capstone projects afford engineering students an opportunity to integrate the disparate components of technical knowledge gained in an academic environment where courses are presented as standalone bodies of knowledge. As a culminating experience, senior capstone is a singular significant experience where students: apply and reinforce the knowledge, skills and abilities (KSAs) learned from course work; enhance communication KSAs; develop interpersonal KSAs; practice project management KSAs; and, enrich design skills.

As a culminating design experience for engineering students the capstone not only satisfies accreditation requirements³, it also provides experience with the design process, the team process and an experiential learning intervention⁴. A common model for engineering capstone includes a student team, a faculty advisor and an industry liaison⁴. Student team sizes of 4–6 dominate most programs². The capstone program usually has a single coordinator who provides instructional content, identifies industry projects, and works with faculty advisors (FAs)². The student team has full design/build responsibilities. The faculty advisor may or may not have technical oversight, project oversight, or consultant-like responsibilities. The industry liaison provides subject-matter expertise, facility access, and resources or supplies. These three components, student team, FA, and industry liaison of the model will have frequent interactions that may be by teleconference, by video conference or face-to-face depending on project or team needs and proximity.

Frequently the engineering capstone model features a real world engineering problem provided by an industry sponsor, oral and written design communications that include periodic external technical design, performance reviews, and final presentations to a broad audience of capstone constituents. Student contributions are expected on the order of 100 hours across one or two semesters and a demonstration of project management KSAs¹.

Issue

Watkins⁵ suggests that the faculty advisor can make a significant impact on the design experience for students and teams. Still, much of the literature associated with engineering capstone is directed at pedagogical rubrics, accreditation assessments, and teams and teamwork. The role of faculty advisor has been largely unexplored. The ‘how-to’s’ of performing the role of the faculty advisor have largely been left as a learn-as-you-go effort or trial by fire. Paretti, et al.², reports on discussions at the 2010 National Capstone Conference where session attendees discussed the faculty advisor role as a coach and mentor who must consider student project team issues such as

- Student motivation.
- Performance expectations.
- Preparedness for design and team processes
- Professional skill levels.
- Experiences of teams.

However, the summary indicated a “...lack of a coherent body of supporting scholarship point to the need ...to provide faculty with practical approaches for addressing these issues in their courses.”

Prior Art

Earlier work by Taylor, et al.⁴, found that successful student design teams had effective team/sponsor relationships, FA awareness of, and concern for, student team success, FA ability to assist in the areas of teamwork and design processes, and effective teamwork. These factors of success were undergirded by what Taylor, et al.⁴, reported as periodic team self-assessment reviews. The self-assessment considered teamwork, design process and project progress/design reviews, not unlike practices found in industry. This self-assessment process was conducted under the tutelage of the FA. Taylor, et al.⁴, refers to this as coaching and describes FA coaching as mentoring, mediating and facilitating. The report did not provide specifics guidance for the FA’s role.

Somerton, et al.⁶, suggest that faculty advisors should only be assigned to mentor capstone teams who are working on design projects consistent with their technical expertise. This is not necessarily consistent with day-to-day activities of the engineering manager or chief engineering manager who will be responsible for a diversity of engineering projects. The engineering manager is responsible for the performance of engineers and engineering related projects assigned to their organization, department or group. Their role is to provide technical guidance, provide resources, and monitor individual and team performance. Groups or individuals may focus on their academic disciplines but will often have broader responsibilities beyond their academic degrees. The professional engineer license process recognizes this by permitting licensed engineers to perform their duties based on their expertise and not limiting the practice of engineering to an awarded degree area. Somerton, et al.⁶, does acknowledge that the capstone design project has an “eclectic nature” that confounds the assignment of a faculty advisor to projects representative of research interests or class room specialty. The ABET criteria for students to demonstrate an ability to function on multi-disciplinary teams also lends credence to the use of a faculty advisor who has broad capability and can provide guidance beyond narrow interests and expertise³.

Watkins⁵ reports on an effort to define the interfaces between faculty advisor and capstone teams that provide a positive impact on capstone teams and their design work. The interfaces included:

- Regular team/FA meetings with frequency determined by design progress.
- Structured team meetings that include schedule reviews and design notebook reviews.
- Stage gates or milestone progress reviews requiring the FAs approval to move forward.
- Design report grading.

By focusing on these team/FA interfaces, Watkins⁵ reports a better student design experience was achieved as were equitable FA workloads. While informative, the interfaces do not provide

structured guidance or procedures for a robust and dynamic interaction between the FA and the student members of the capstone project team.

Development of a “Practical Approach”

East Carolina University (ECU) initiated its engineering program in 2004. Approximately half the faculty are tenure track and relatively new to the FA role and half have considerable expertise in a variety of industries. The program culminates in a two semester capstone design project based learning experience for all engineering students. The ECU engineering program relies on industry sponsored projects for most of the capstone design experiences. Industry projects are preferred because of their immediate value, true success oriented objectives, and for their ability to imitate the pressures for performance found in industry⁷.

These projects are usually proposed as open-ended statements which are believed to increase student motivation, and to provide an introduction to the world of engineering^{8,9}. ECU seeks sponsored projects as part of a process requesting potential sponsors to provide project background, summary objectives/requirements, design expectations (deliverables) along with some administrative data including point of contact. Students are assigned project teams and their first assignment is to begin crafting a problem statement for their project. Bruce¹⁰ states that a goal of capstone design is the formulation of realistic team-based design environment.

As Paretti, et al.², pointed out there are limited resources available to guide the FA. The growth of the program has required inexperienced faculty to serve as FAs in order to support the increasing number of capstone projects associated with enrollment growth. Absent experience, newer faculty requested guidance on fulfilling their role as an FA. In order to support this request, a call was distributed to the capstone community for examples of FA guidance documents. The request was distributed electronically to two groups, recent National Capstone Conference attendees (N~600) and to American Society for Engineering Education’s Design in Engineering Education Division through a list_serve (N~800). Only one program responded to the request with a copy of the documentation used in their program. This documentation was a full description of their capstone process that included one section entitled “Expectations of Faculty Mentors”. This section contained general information consistent with Watkins (2009) “interfaces”. This document, while useful for the providing program, did provide the depth that ECU faculty desired.

Lacking input from the capstone constituency, the ECU program drafted *The Faculty Advisor and Senior Capstone: A Handbook* from anecdotal inputs and experience. The guideline, currently a “beta” version (Appendix A), was developed using the outline described by Watkins⁵. The guideline is meant to serve as an FA specific document that parallels and supports a previously developed capstone student handbook.

Following development of the handbook draft, the document was reviewed by the ECU engineering faculty including experienced and inexperienced capstone FAs. Feedback included a request for examples of how to address situations that occur during FA/team interactions. In response, ‘Practical Experience’ vignettes were added to the guidebook. These vignettes provide summary descriptions of events that describe intervention leading to modifications of team performance. These vignettes highlight interventions that were perceived to enhance team

performance. These interventions are often based on specific situations often times without warning and therefore no quantitative data are available as to their effectiveness.

Path Forward

The development of *The Faculty Advisor and Senior Capstone: A Handbook*, is considered a work in progress. While providing some specifics, the handbook is meant to provide a robust framework that is adaptable to specific environmental influences, team personalities, and project requirements. The handbook will be edited and reviewed each calendar year similar to the ECU Engineering Department's Capstone Student Handbook (a.k.a. the Purple Book). However, the ECU Engineering Capstone program also solicits input from other capstone programs. Capstone course coordinator, faculty advisor, course instructor and capstone student comments are solicited with the thought being that the *The Faculty Advisor and Senior Capstone: A Handbook* is a work that can potentially benefit other faculty advisors.

The author is appreciative of the challenging insights from the reviewers. The insights suggest opportunities for further development of the handbook that may support collaborative efforts relating the FA handbook to measurements of student success, exploring the relationship of FA experience and capstone team challenges, and capstone team failure modes.

References

1. Paliwal, Manish, Bijan Sepahpour (2012). A Revised Approach for Better Implementation of Capstone Senior Design Projects, *Proceedings of the 2012 American Society for Engineering Education Annual Conference & Exposition*, San Antonio TX, June 10-13
2. Paretti, M, Richard Layton, Stephen Laguette, Greg Speegle (2011). Managing and Mentoring Capstone Design Teams: Considerations and Practices for Faculty, *International Journal of Engineering Education*, v27n6, 1-14.
3. ABET (2014), Accreditation Criteria and Supporting Documents, <http://www.abet.org/accreditation-criteria-policies-documents/>, Accessed December 6, 2014.
4. Taylor, Dorothy G., Spencer P. Magleby, Robert H. Todd and Alan R. Parkinson (2001), Training Faculty to Coach Capstone Design Teams, *International Journal of Engineering Education*, v17n4&5, 353-358.
5. Watkins, Gregory (2009). Defining the Role of the Faculty Advisor in a Mechanical Engineering Capstone Design Course, *Proceedings of the 2009 American Society for Engineering Education Annual Conference & Exposition*, Austin TX, June 14-17.
6. Somerton, Craig W., Brian S. Thompson, and Craig Gunn (2003). The Role of the Faculty Advisor in the Capstone Design Experience: The Importance of Technical Expertise, *Proceedings of the 2003 American Society for Engineering Education Annual Conference & Exposition*, Nashville TN, June 23-25.
7. Charyton, Christine, Richard J. Jagacinski, John A. Merrill, William Clifton and Samantha DeDios (2011). Assessing Creativity Specific to Engineering with the Revised Creative Engineering Design Assessment, *Journal of Engineering Education*, v100n4, pg 778-799.
8. Author, *Proceedings of the 2012 American Society for Engineering Education Annual Conference & Exposition*, Atlanta, GA.
9. Author, *Proceedings of the 2014 American Society for Engineering Education Annual Conference & Exposition*, Indianapolis IN.
10. Bruce, J.W. (2004). Design Inspections and Software Product Metrics in an Embedded Systems Design Course, *Proceedings of the 2004 American Society for Engineering Education Annual Conference & Exposition*, American Society for Engineering Education, Salt Lake City.

The Faculty Advisor and Senior Capstone: A Handbook

Beta Edition: 2014, Draft C

Adapted from Watkins, Gregory (2009), Defining the Role of the Faculty Advisor in an Mechanical Engineering Capstone Design Course, 2009 ASEE Annual Conference, Austin.

Purpose

This handbook is provided to encourage consistent participation by ECU Engineering faculty and practitioners who are involved in the Capstone process. While no two projects are alike, no two teams are alike, and no two advisors are alike, advising cannot nor is it expected to be alike. Still expectations for advising exist. The expectations for advising a student Capstone team revolve around guiding the students through the learning experience that is Capstone.

For the ECU Engineering Capstone process, success is defined as student learning. In this context, Student learning is not limited to the application of existing or in-process academic classroom knowledge. Student learning is stretching what is learned in the class room with the acquisition of new knowledge, new skills, and new abilities required to complete the project.

The faculty advisor's role is not to complete the project. The faculty advisor is not responsible for the success of the project even though a team failure may result in some self-flagellation. We often learn most in failure and so do students. Sponsors have experienced failure also. Still the goal of Capstone is for students to learn to apply design, and to expand their engineering knowledge, skills and abilities KSAs beyond what they've learned in the classroom and that may involve failure on some level; the goal is not to induce failure. Let 'em stumble. Let 'em fall. Let 'em pick themselves up. As a faculty advisor, guide them in reflecting on what happened and push them to excel.

This guide is offered in the spirit of helping students and faculty excel in Capstone. This is the faculty version. Use this in conjunction with the "Purple Book", i.e., Senior Engineering Capstone Project Handbook.

FA Role

The faculty advisor's role is to meet regularly with the team, provide technical guidance for the content of the project, provide engineering manager's advice on the quality of the project schedule and general project management, attend site visits, attend team presentations/oral reports, and be a reviewer/grader for design reports and design notebooks. That's it. No other assignments. No other grading. No other duties or responsibilities. That is really enough to do for Capstone.

However, these are students. These are teams. Those two combined mean that occasionally team and team member counseling is required. That goes along with being a faculty member.

The FA will provide grades for the end of the semester design reports along with other FAs and the course coordinator. Forms are provided in the "Purple" book to guide reviews and grading. Electronic page copies of these forms are available from the course coordinator and are usually provided when the reports are distributed. If you don't have what you need, ask the course coordinator.

Jump Start

Here are some suggestions for successfully performing as an FA (adapted from Paliwal, Manish and Bijan Sepahpour, A Revised Approach for Better Implementation of Capstone Senior Design Projects, 2012 ASEE Conference, San Antonio).

- Plan a comprehensive first meeting, reviewing the project proposal, project logistical challenges, and prior art searches.
 - Review the role of team members as individual contributors and make it clear the success of the team depends on the performance and dedication of each team member
 - Discuss the value of ECU Library resources including Dr. [Redacted] (Engineering Research Librarian) for researching prior art, ideation techniques, etc.
 - Discuss the team's BlackBoard® file exchange capabilities. Discuss the intellectual property (IP) issues of using unprotected storage and/or file sharing processes and tools.
 - Discuss other project related IP issues.
 - Discuss the networking needs of the project as an opportunity for increasing subject matter expert participation and career building.
 - Discuss the impacts of scope creep/change on success.
 - Discuss the importance of a robust, dynamic project schedule for communicating project progress, needs and resource requirements.
 - Discuss the risks and opportunities of rotating leadership, single voice of communications with the sponsor and meeting planning.
 - Encourage ideation and prototyping as a means of getting to a preferred solution.
 - Discuss the role of Capstone in the accreditation process.
- Establish a regular schedule for team-FA meetings for the semester.
- Review weekly progress reports
- Review meeting agendas and MSProject® schedules prior to team meetings.
- Make yourself available to the team while communicating the need for respecting demands on your time.
- Encourage practice oral design presentations at lower level classes if you detect a need to enhance presentation skills.

Regarding BlackBoard®. Each FA will be given instructor status for both First and Second Semester Capstone courses as appropriate. You can use the BlackBoard® tools to interface with your team, exchange files, view presentation recordings, etc.

Student Learning

Design education can be divided into three areas design knowledge, design processes and design products. Capstone addresses all three of these areas by considering their focus. Design knowledge represents terminology, concepts and relationships between design inputs and design outputs. Design processes are the necessary steps for creating design products. Design products are the artifacts created as a result of design activity and include resulting software, systems, materials, or objects (Schilling, Walter (2012). Effective Assessment of Engineering Design in an Exam Environment, 2012 ASEE Annual Conference, Atlanta). In a nutshell, Capstone students are learning that design is decision making and engineering is problem solving. As a point of reference, a Capstone project represents 400-600 FTE hours across the two semesters. This equates to ~ five hours per week, per student.

Team Meetings

Communication is the key to engineering design success. Communication is most efficient when dialogue is face-to-face. For Capstone projects, that dialogue occurs most commonly in the form of a team meeting. Meetings are a fact of the business environment.

It is expected that the faculty advisors meet regularly with their teams. Three hours of every Capstone student's schedule have been blocked on Thursday afternoons for meeting/travel times. For some faculty advisors this is a convenient time to meet with their teams. If you have a class or other commitment at that time, students have been told to work with you to identify a mutually convenient time to meet each week.

Occasionally, students will schedule work hours during the Thursday blocked time. This is unacceptable as this is a regularly scheduled class meeting time. If meetings are missed, offending students should be warned and penalized in the FA evaluations of team member performance (discussed later, IV.A.6) at your discretion. What is rewarded, is reinforced, what goes unchecked is rewarded.

Capstone team meetings should reflect sound business practices, i.e., the team meeting should teach the content of a typical project team meeting in industry by example/experience. In Capstone meetings, teams are required to update progress (what have you done), develop a path forward (what are you going to do), and identify issues (what problems/obstacles block progress).

I've never been in a project review meeting that didn't include a review of the project schedule. At the beginning of the semester students are provided a project schedule template. The template is posted on BlackBoard® and is accessible to students and to you. This template includes both a schedule of class topics and assignments and a schedule of reasonable and expected project activities and milestones. The schedules include tentative dates of presentations (final and draft), submission of reports (final and draft; necessary comment review time, and comment incorporation time), and covers First Semester Capstone and Second Semester Capstone for the same semester. The astute First Semester Capstone students will look over the Second Semester Capstone schedule to know what is coming in their next semester. Note that notebook reviews are not included. The FA should "surprise" the team with graded notebook reviews. "If you tell them when, they will procrastinate till then." (Unpublished Author-ism)

A typical Capstone meeting should last less than an hour. Students are required to provide a meeting agenda and an updated project schedule to their FA before the meeting. It only takes a minute or two for the FA to review these before the meeting. If the agenda and schedule have not been provided, it is up to the FA's discretion whether to cancel or hold the meeting. Sometimes students will show up in the FAs office 10-15 minutes before the scheduled team meeting and write an agenda on the white board. Accepting that is up to the FA.

If you would like to complete a record of each meeting, a *Meeting Log Sheet* is provided in the Appendix of this handbook [Available from the author by request]. If you elect to use the *Meeting Log Sheet*, you might consider sharing the sheet with the team. You could also keep copies to help in your team member performance evaluations during the semester.

Capstone Content

Class time is scheduled each Tuesday of the semester. First Semester Capstone content covers design methods and some professionalism materials. The latter seeks to prepare students for career fairs. Second Semester Capstone content focuses on professionalism topics that are geared towards preparing students for their careers.

Each semester the course coordinator lays out the Capstone course requirements and course content in an MSProject® schedule. This course “project” schedule is provided to students and FAs. The schedule is meant to be used as a template by the project teams to guide their development of their project schedules. The template will have start and finish dates for most of the course requirements. Project related activities may or may not have start and finish dates so that students can customize the template for their project needs.

Some Basics

Capstone projects are funded by donations. Project materials and expenses will be normally covered by existing laboratory sources. Some projects require more extensive (what is not normally in our labs) materials and fabrications. Students are directed in the Capstone handbook to provide a bill of materials and an assembly drawing with their requests for purchases. Additional instrumentation and or special processing are the responsibility of the sponsor. The course coordinator will have made this clear with the sponsors before the project begins. If you or your team have questions concerning materials and/or fabrication, discuss those with the course coordinator. The course coordinator approves all Capstone related purchases.

Practical Experience: Students will let you do this project if you take charge. Resist the urge to use your knowledge and experience to give them short-cuts and a path to a quick finish. You should use little of your brain on this. It is their project, their design. If they do something stupid, they learn. If they continue to generate stupid design, they will get frustrated. [Redacted] and I had a team that fooled around for 11 weeks before they realized they could have been finished 7 weeks earlier. It took them that long to understand the project. Lead them to the discovery of a good solution but do not do the project for them. They should finish thinking it was their idea.

FA Duties

The FA duties are designed to develop Capstone design documentation that aids and abets the ECU Engineering accreditation process, promotes continuous programmatic improvement and facilitates student learning.

FIRST SEMESTER CAPSTONE Semester

Sponsor Communications

Project teams are required to communicate weekly with their sponsor’s liaison by email. The FA and course coordinator will be copied on this weekly communique. This need not be the only

communications. It is the minimum communications. It is not unusual for FAs to host teleconferences for their teams and sponsors during the regularly scheduled FA-team meetings. Other communications with the sponsor are at the FA's discretion based on need and circumstances, e.g., campus events such as weather related campus closing should result in sponsor notification.

Sponsor Visitations

Each team is required to visit their sponsor within the first two weeks of the semester. Sponsors expect this visit and they expect the FA to accompany their teams for this initial visit. If an FA cannot make the first visit due to schedule conflicts, they should contact the course coordinator who, if schedule permits can accompany the students. For many students, this may be their first visit to an industrial facility. Having an FA or other faculty advisor can guide them through the check-in process, facilitate introductions and, if traveling together, guide a post-visit discussion on the return trip.

Teams are expected to visit the sponsor's location regularly, as required throughout the semester. "Regularly" is dependent on logistical issues and can be discussed with the sponsors. Teams should visit as needed to support an open communications. FAs will have to determine the necessity of accompanying the teams on these subsequent visits. Sponsors have expectations about FA participation in these visits. FAs should be aware of those expectations. It is critical for FAs to visit the sponsor with the team as early as possible in the semester. This will help you understand what the team is learning and what questions they are not asking. It is also critical for engineering program-sponsor relationships for either the FA and course coordinator or both be present for the final presentation at the sponsor's location. If the sponsor is expecting the FA to visit and it is just not possible for you to make it, contact the course coordinator. Perhaps a substitute can be arranged.

Project Problem Description

During the first thirty days of the semester students are given the assignment to develop a problem description that includes the project's problem statement and the project's problem definition. The "Purple" book provides a full explanation and an example of a project problem description. FAs should familiarize themselves with this material in order to provide a consistent content that will promote a complete, thorough problem description. The course coordinator will discuss the iterative nature of problem descriptions and require an assignment relative to developing the project problem description. An initial project problem description is required by week 5.

Practical Experience: I once had a team that seemed content to lob emails at the sponsors and was getting nowhere. When they were "encouraged" to start visiting their sponsor (90 minutes from campus), they were surprised how much information flow was improved. Each project is different. Sponsors understand logistical issues.

Practical Experience: For a team that was working in an area in which I wanted to develop skills by working with the sponsor, I attended 80% of the team's visits. For other teams, I've accompanied the team on 1 or 2 visits. Both approaches provide improved information flow. Sponsors want an indication of an involved FA that staying on campus does not provide.

Practical Experience: Sometimes I travel with the teams, i.e., in the car. Once, after an initial sponsor visit with a team, we had an hour's drive back to campus. It was a great time to pose thought questions to them about what they saw, what they heard and what they were thinking. During the course of our "confined" times, students started developing more in-depth questions that could be addressed at their next meeting. I had greater confidence that they were prepared for their next meeting. YMMV. Practical knowledge takes time. It is developed. It doesn't come (always) with a flash.

Written Design Reports

Teams submit 3 written design reports during the semester, two preliminary design reports and one final. Each is to be reviewed by the team's FA. The drafts will be graded for technical content, grammar and formatting using guides/forms/requirements from the "Purple" book. The milestones for these reports are included in the course schedule. The FA should monitor their team's progress on these reports to ensure that the FA has adequate time for review, comment and comment incorporation prior to submittal for grade. Late submittals, particularly those that impact the FA's review time, should be addressed in the team grade. Grading forms can be annotated for adjustments. Similarly, if review comments are not addressed in subsequent drafts, grade adjustment can be made. The purple book contains a requirement that previous markups are to be submitted with drafts for reviews.

Oral Design Reports

Teams will be providing 2 or 3 oral design reports based on course progress and class size. The last oral design report is held in conjunction with the fall colloquium or the spring symposium as determined by which semester the FIRST SEMESTER CAPSTONE course starts. This last oral presentation is for grade.

Teams are expected to dry-run (industry speak for practice) their presentations with their FAs. As you become more comfortable with the team's presentation skills, you may decide to waive dry runs. Dry runs should be more than looking at *.ppt slides. Slides are not presentations. Slides are presentation supplements. Our goal in ECU Capstone is to develop presentation skills not *.ppt skills.

FAs are expected to attend the final oral design reports. FAs are also expected to attend the practice presentations, however, schedules sometimes conflict. An alternative would be to review the (practice and final) video recordings (loaded onto BlackBoard®) with the team during a regularly scheduled team meeting (added to the agenda). FAs are also asked to participate in the evaluation of all teams presenting at the time the FA's team presents, practice and final.

The class size dictates the recording venue which influences the number of presentations. All oral presentations are recorded and team members are asked to evaluate their performance as part of their course mid-term examination.

The milestones for the oral design reports are included in the course schedule. The FA should monitor their team's progress on preparing for the oral reports by participating in dry runs. The course coordinator can also be requested to participate in dry runs.

Teams are required to provide oral presentations to their sponsors at the sponsor's location (occasionally sponsors may find it convenient to come to campus). Sponsors know that this is a requirement. FAs are expected to attend. This requires considerable coordination with the team's schedule, the sponsor's schedule, and the FA's schedule. These oral design presentations are focused on the technical content so unless the team and sponsor agree otherwise (i.e., for practice purposes), company background information does not need to be included. They know. This helps teams learn to style presentations for the audience.

It is recommended that teams present a dry run with their project liaison prior to the final sponsor presentation. This helps clarify language, jargon, and the redaction of business sensitive information.

The project's industry liaison will invite various managers to the final sponsor's presentation. The FA and course coordinator should attend if at all possible to support the students and to enhance the community-grown relationship.

Team Member Evaluation

Twice during the semester the FA will receive an email requesting an evaluation of each team member's performance. The evaluation is a simple online Qualtrics® survey. The FA's evaluation of team member performance is factored into the individual student's final grade. The sum effect of FA and peer evaluations can impact a team member's final grade by a maximum of one letter grade. The "Purple" book provides more details on Capstone Grading.

Second Semester Capstone Semester

Sponsor Communications

The second semester of Capstone is not a time for relaxing and coasting. Students will be subject to two critical impediments to progress: senioritis and job hunting. Overcoming these impediments requires a focus on the project schedule and weekly communications. Project teams are required to communicate weekly with their sponsors during the second Capstone semester. The FA will be copied on this weekly communicate. Other communications with the team and sponsor are at the FA's discretion based on need and circumstances, e.g., campus events such as weather related campus closing should result in sponsor notification.

Sponsor Visitations

Each team is required to visit their sponsor as soon as possible to regain momentum lost during the semester break. Sponsors are usually anxious to see progress renewed and they expect this restart visit. It is important that the FA reestablish contact and accompany teams for this 'restart' visit.

Teams are expected to visit the sponsor's location regularly, as required throughout the semester. FAs will have to determine the necessity of accompanying the teams on these subsequent visits. Sponsors have expectations about FA participation in these visits. FAs should become aware of those expectations.

Project Problem Description

The first thirty days of the semester are a good time for students to review/iterate on their problem description, constraints/objectives, alternatives, and preferred solution identification methods and processes. The FA should be encouraging iteration. The course content will cover multiple methods of ideation/alternative generation, e.g., biomimicry.

Written Design Reports

Teams submit 2 written design reports during the semester, one preliminary and one final. Each is to be reviewed by the team's FA. The drafts will be graded for technical content, grammar, and formatting using guides/forms/requirements from the "Purple" book. The milestones for these reports are included in the course schedule. The FA should monitor their team's progress on these reports to ensure that the FA has adequate time for review, comment, and comment incorporation prior to submittal for grade.

Oral Design Reports

Teams will be providing 2 or 3 oral design reports based on course progress and class size. The last oral design report is held in conjunction with the fall colloquium or the spring symposium as determined by which semester the Second Semester Capstone course starts. This last oral presentation is for grade. FAs are expected to attend the final oral design reports. FAs are expected to attend the practice presentations, however, schedules sometimes conflict. An alternative would be to review the video recordings with the team during a regularly scheduled team meeting (added to the agenda).

The class size dictates the recording venue which influences the number of presentations. All oral presentations are recorded and team members are asked to evaluate their first performance as part of their course mid-term examination.

The milestones for the oral design reports are included in the course schedule. The FA should monitor their team's progress on preparing for the oral reports by participating in dry runs. The course coordinator can also be requested to participate in dry runs.

Teams are required to provide oral presentations to their sponsors. Sponsors know that this is a requirement. FAs are expected to attend. This requires considerable coordination with the team's schedule the sponsor's schedule and the FA's schedule. These oral design presentations are focused on the technical content, so, unless the team and sponsor agree otherwise (i.e., for practice purposes), company background information does not to be included. They know. This helps teams learn to style presentations for the audience.

It is recommended that teams present a dry run with their project liaison prior to the final sponsor presentation. This helps clarify language, jargon, and business sensitive issues. The project's industry liaison will invite various managers to the final sponsor's presentation. The FA and course coordinator should attend if at all possible to support the students and to enhance the community-gown relationship.

FAs are expected to participate in the evaluation of all teams presenting at the time the FA's team presents.

Team Member Evaluation

Twice during the semester the FA will receive an email requesting that an evaluation of each team

Practical Experience: Once in a team of four, two students were extreme Type A personalities and two were (porch case) Type B's, i.e., the team was bi-polar. The type A's reached a breaking point with the type B's not participating. The came to me alone and asked for advice. "Everybody come for a team meeting with me." They all did. Each was given the opportunity to "confess" strengths and weaknesses. This went on for 10 minutes or so until I realized the discussion was self-sustaining. I excused myself and told them to continue. I went outside and found a rock. When I came back, I introduced them to three rules: 1) Rule of the Rock. Whoever was given the rock had to contribute, immediately; 2) Rule of Pizza. Who ever was late to a meeting had to buy pizza. They ate well at those meetings for awhile; and 3) D2's Rock Rule. The rock was mine and had to be returned to me at the end of the semester or they all would get an incomplete. No excuses. From time to time I would ask who had the rock. They always knew. There were no more complaints. They had a decent Capstone and experience. And, I got my rock back. Be creative. Look at literature on conflict resolution and apply it. The sponsors are told the same thing. Get 'em ready for a career.

Practical Experience: A team member walked into the office to question his final grade. It was a "B". "What happened?", he asked. "Let's look.", I replied. We reviewed his individual scores and all were good except the team evals. The team did not consider him a good team player and that cost him a letter grade. His attitude was spot on. "This is not right. I'll meet with the team and see what I need to do differently."

Appendix A

member's performance. The evaluation is a simple online Qualtrics® survey. The FA's evaluation of team member performance is factored into the individual student's final grade. The "Purple" book provides more details. Peer and FA evaluations can impact a team member's final grade by up to one letter.

Summary

Capstone is about student learning. Students learn by many methods. Capstone focuses on experiential learning. Experiential learning is challenging for students and for experiential learning mentors such as liaisons, FAs and course coordinators. The projects themselves are challenging for students and FAs. Working with a new, or different team is challenging for students and FAs. Meeting with students and liaisons frequently can be time consuming. Consistency in student learning through the capstone experience is the goal of preparing faculty advisors. This handbook is meant to serve as a basic starting point.

If you reach near the end of your rope, consult with the course coordinator. Collaboration is good and as the wisest man who ever lived said, "Two are better than one and a three-fold cord is not quickly broken."

Appendix

Faculty Advisor _____ Date: _____

Project Title: _____

Team Members & Logbooks:

Name					
Present					
Logbook reviewed					
Meeting participation					
Apparent Progress Contribution/Performance since last meeting					
Previous comments addressed/noted areas for improvement.					
Comments					

MS Schedule

Updated since last meeting:	
Appropriate activities/tasks planning:	
Appropriate milestones identified:	
Progress statuses for activities/tasks:	
Comments	

Issues: (on back)