

## Scope Management for Independent Study projects

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### Abstract

Independent study projects serve as avenues for mature students to participate in detailed study projects on topics of their own interest. These study projects foster student creativity and self-motivated, autonomous work, which frequently results in a student's best work. Often, these projects are inter-collegiate competitions, independent research, or a community or business sponsored project. Ultimately, these independent study projects serve as a tool to inspire young students in their chosen profession and strengthen a commitment to lifelong learning.

Unfortunately, this opportunity for autonomous, creative, inspired learning may become a source of frustration and disappointment for both the student and faculty advisor. Sources of frustration are many. A likely source is the difference in expectations held by the faculty advisor and student. Faculty advisors and students alike feel additional frustration when a time demanding, quality product is produced, but it isn't what the faculty advisor really had in mind. Faculty advisors must remember they are working with a student educated usually in a formal classroom environment where expectations are translated in the form of design projects, home works, and exams. Their grade is based on these events. It is universally understood that these graded requirements constitute a contract between professor and student. Typically the student has little input into the contract, but signs his or her name when they sign up for the course. This paper discusses the beneficial elements in a faculty advisor-student contract for independent study projects. A well-defined contract is often the key to a rewarding independent study.

### I. Introduction

Independent study projects are often designed for students who demonstrate the ability to work autonomously and the creativity to work on projects that are open-ended and sometimes research oriented. These projects are inherently different from the organized, professor led, contemporary courses. The independent study projects are also closer to the autonomous environment students will experience as engineers working in their chosen profession. Research or student projects with industry involvement become an invaluable non-attribution glimpse of life as a professional.

Some students excel in the classroom and on independent study projects. However, for many, an independent study project is a student's first experience with truly independent work after twelve to fifteen years of guided schooling. Students and professors alike must dedicate time prior to registering for the independent study project to ensure that all understand the expectations and the scope of the project. A faculty advisor-student contract is an efficient means to develop the necessary boundaries.

The absence of any formal discussion or written expectations may result in frustration for all. The professor may find that he has failed to resource the required material or failed to provide it when required. The student's current level of education or experience may impede him from completing the independent study project successfully. Once the contract is developed, the professor may find that the projects successful completion may not be achieved in the one or two semesters allotted. This may or may not be critical. Once project requirements are understood, the student may not have the necessary personal time to dedicate to the project for a successful grade. The student and especially the faculty advisor must realize that the time requirements must be comparable to a typical 3 credit hour course at the same level and ensure the scope of project is within those standards.

## II. Project Contract

Contracts may be written or verbal and should be a combination of input from both the faculty advisor and the student. Written are preferred because both the professor and student can make references to the contract quickly. In some cases, an aggressive student who desires to pursue further work in a certain area may develop a project himself. He may desire academic credit for work that may not meet academic requirements for a thesis. The contract would provide a clear purpose and project definition. An excerpt from an independent study contract in Figure 1 is an example of a general project statement.

1. INTRODUCTION: The purpose of this contract is to outline the requirements that must be met in order to complete the CE489 independent study project.
2. PROJECT BACKGROUND: Analysis of Actual Modulus of Elasticity ( $E_c$ ) results for High Strength Low Density (HSLD) Concrete mixes vary from values predicted by the ACI 318-99 equations. Several researchers previously noted this discrepancy. However, ample data is still needed to allow for proper correlation.
3. PROJECT DEFINITION/IMPORTANCE: This project will provide additional data required to analyze current and proposed modulus equations. Initially we will develop mix designs using available aggregates and cementitious materials. We will complete 12 mix designs using 6 basic mixes with the two different regional lightweight aggregates. From each of these mix designs we will form 4" X 8" cylinders for strength testing and 6" X 12" cylinders for modulus testing. These cylinders will be cast, cured, prepared and tested IAW the appropriate ASTM references. We will conduct 3, 7 & 28-day compressive strength tests on three (4" X 8") cylinders from each individual mix. Modulus of Elasticity tests will be conducted at 28-days on three (6" X 12") cylinders from each individual mix.

Figure 1: Contract Introduction, Background, & Definition

The contract ensures students understand what is required. It is important that the students are aware of the time requirements and have available time in their schedule. Each student must be committed to individual work and possess the self-motivation to work open-ended problems

without constant supervision. This is a wonderful opportunity for self-development - it is not an easy 3 hour course with a guaranteed A.

Inherent professor responsibilities often include resourcing, which includes materials, testing equipment and travel funds and ensuring the required funding is approved and available. However, the critical step is determining the appropriate scope of the project based on the capabilities of the student(s).

### III. Project Objectives

Time requirements should be comparable to other courses having the same hourly credit. If deliverables are expected at determined times, these must be specified. As a minimum, a list of the major objectives and requirements should be written in the contract. Figure 2 illustrates a list of major tasks generated for the project identified in Figure 1 above.

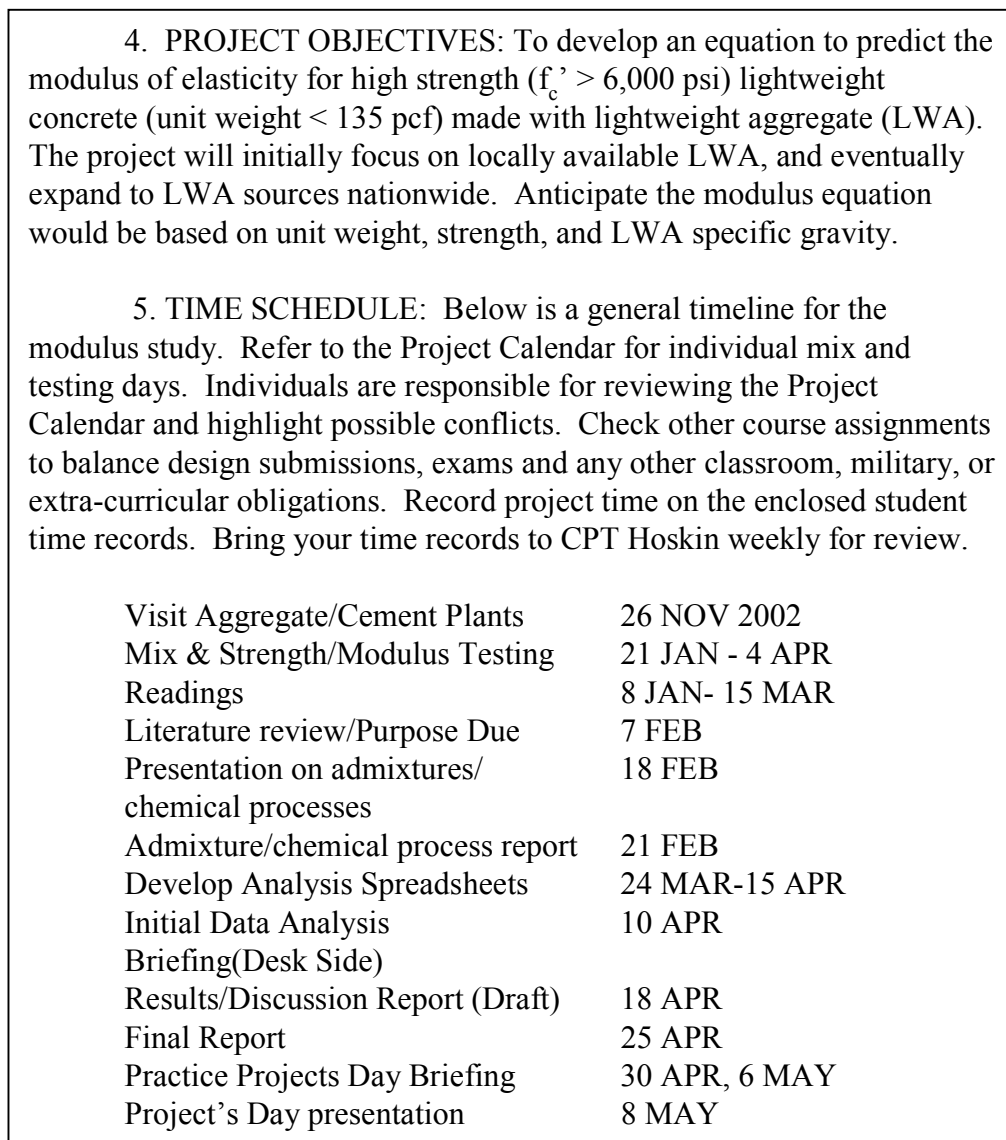


Figure 2: Project Objectives and General Timeline

#### IV. Project Calendar & Time Record

Often, a student's worst enemy is procrastination. Other courses will have his/her more immediate attention. Since their work is due tomorrow, their homework submissions and exams will monopolize the student's time. One effective tool for both the advisor and student is a calendar with intermediate objectives. It allows a student to manage tasks and deconflict obligations with other courses. It can also help the faculty advisor monitor progress and ensure that the student does not allow himself to fall far behind.

February 2003						
S	M	T	W	T	F	S
	2	3	4	5	6	7
8	9	10	11	12	13	14
15	16	17	18	19	20	21
22	23	24	25	26	27	28
29	30					

Monday	Tuesday	Wednesday	Thursday	Friday
3 2 DAY 12:30pm Mix # 2	4 1 DAY E HR(Statics) 8:30am 7-Day # 1 8:30am Strip #2 CADETS	5 2 DAY T LAB	6 1 DAY 1:30pm 3-Day # 2	7 2 DAY LITERARY REVIEW/ PURPOSE <u>DUE</u>
10 1 DAY 8:30am 7-Day #2	11 2 DAY 12:30pm Mix # 3	12 1 DAY E HR(Strengths) 8:30am Strip # 3	13 2 DAY	14 1 DAY E HR DROP 1:30pm 3-Day # 3

Figure 3: General Calendar

Some faculty advisors may require the students to maintain a time log. The log may assist the faculty advisor in making adjustments to the calendar since some schedules may need to be advanced or delayed. Amendments to the contract may allow the advisor to remove some of the less critical requirements to allow concentration of effort on the key items. Figures 3 and 4 demonstrate a general calendar of events and a student time record respectively. Previous time logs will also assist the faculty advisor in future independent study project development. Of course, individual capabilities always lead to time variations, but such records still assist in general planning.

CE489: Modulus Study		Cadet: _____			
Item	Activity	Date	Time		Time (min)
			From	To	
#1	LAB INTRO - Material TESTING - Mix PROCEDURES	24 JAN	1345	1530	105
#2	Mix #1 - Material PREP - MIXING - Cylinders	28 JAN	1300	1545	165
#3	STRIP #1	29 JAN	0800	0825	25
#4	3-DAY STRENGTH (#1 MIX) - 4 Cylinders (4x8) - Unit Wgt/Cylinder Wgt	31 JAN	0800	0915	75

Figure 4: Student Time Record

## V. Signing the Contract

Providing clear guidance and an organized list of objectives clearly demonstrates the importance everyone should place on the project. Both the advisor and student's valuable time warrants such an approach. Students must sign up for the project both physically and mentally. Once a student understands what he/she is expected to accomplish, signing the contract helps to bind them to meeting these objectives. They will also understand the focused attention a faculty advisor places on the project. The signature format in Figure 5 illustrates the joint obligation and agreement between both the student and advisor.

7. The following undersigned parties are in agreement with this contract

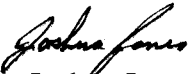
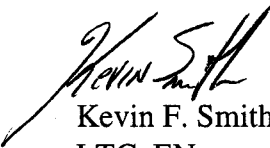
 Joshua Jones CDT LT, USCC CE489 Group Member	 Kevin F. Smith LTC, EN CE489 Advisor
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Figure 5: Signature Blocks

## VI. Assessment

The endstate we strive to achieve is a challenging learning experience that forces students to apply creativity and work independently. The experience should motivate them toward continued learning in their chosen profession. At the United States Military Academy, we have assessed the effectiveness of our independent study projects principally through the use of our institution's course-end feedback system. This system is administered entirely over the worldwide web and features a small number of USMA-standard survey questions, supplemented by department-specific and course-specific questions of our own choosing. The system allows students to respond in a "free text" format to the question, "What did you learn from the course?" Below are several responses to this question:

- I feel that this course was the perfect completion of my undergraduate education in civil engineering. I learned a great deal about what it takes to put together a project from ground zero to the preliminary design. It was perfectly tailored for what I need to learn.
- Students can make a difference.
- We have the knowledge to solve real-world problems.
- I know more than I thought I did about engineering and the problem solving methodology.
- I learned that there is much more to civil engineering than what I have learned in formal training.
- Working on an ambiguous project is more time consuming than other projects here.
- How to think outside of the box.
- That real-world problems require in-depth thinking and problem solving and that the skills I have learned earlier in my student career are actually applicable.
- My designs will work in real life and I am capable of designing something that works.

- There are so many points in a project to get stopped or distracted. I learned how to anticipate them and react to them.

Students also respond to additional questions using a scale of 1 (strongly disagree) to 5 (strongly agree). For the USMA-standard questions, this system allows us to compare our own students' survey responses to those of all other students at USMA. More importantly, the inclusion of course-specific questions allows us to survey our students about their achievement of specific course objectives. We have selected a few of the questions, which focus in on the underlying objectives in an independent study project. Are the students inspired through organized projects to a lifetime of continued learning? Do they learn to think critically? These questions and others are compared between the entire USMA results and the independent study projects (CE489) in Figure 6 below.

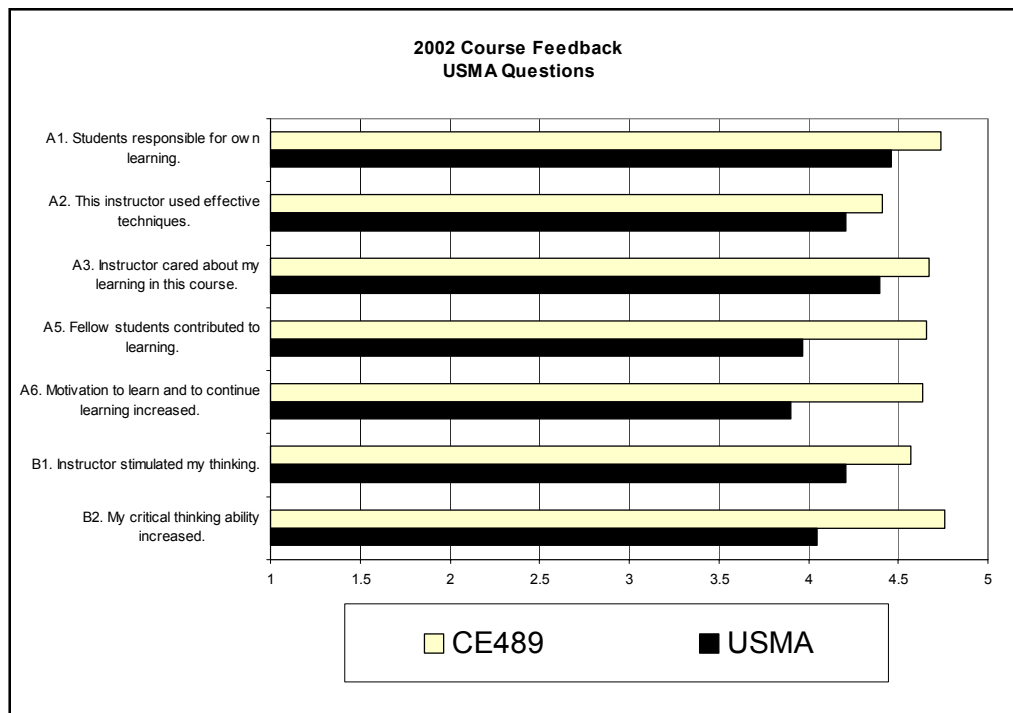


Figure 6: CE489, Independent Projects course feedback

The questions above highlight the benefits of well organized, challenging independent study projects. The open-ended projects that generally meet formally once a week are just as effective, if not more effective, than the standard course. The project contract and tracking of time spent on the project obviously provide the necessary guidance toward a successful course. We would like to highlight A1, A6, and B2. If we can challenge students to self learn, increase their motivation to learn and improve their critical thinking ability prior to departing from the institutional environment, we have gone a long way toward preparing them to be industry leaders in the future.

## VII. Summary

Independent study projects are generally organized in many different ways. However, the approach one should take in organizing the project should be compatible to the project and the capabilities of the students. Regardless, the professor and student must communicate most of the expectations. The approach discussed above is just one successful approach. To make the most

of your and your student's time during the semester, some dedicated planning, resource allocation, and assessment of student skill is necessary prior to the start of the semester.

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