

ISyE 4104 DESIGN I

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Prerequisites: ISyE 4044, 4101, 4102

1 COURSE OBJECTIVES

This course is intended to:

1. Provide a problem analysis and system design experience similar to ISyE professional practice.
2. Provide an opportunity to practice and perfect the skills of technical report writing and oral presentation.

The skills you should sharpen in this course include:

Systems analysis and design: including the ability to

- define a problem,
- identify and analyze relevant factors,
- develop a model of the problem,
- generate and evaluate alternative approaches for accomplishing the desired objective, and
- design the needed system.

Technical Writing: You have chosen a field that demands effective written communication. Your skill in documenting the results of your work will determine to a large extent the value of that work.

Public Speaking: It is not enough to do good work, you must also convince others, who may be apathetic or even antagonistic, that the work is good. Your skill in clear, concise, and convincing presentation may make the difference between a successful project and fruitless effort.

In addition, this course is an opportunity for you to distinguish yourself from your class mates and other young industrial engineers. Use this opportunity to find out more about the kind of career you want and as a launch pad for that career. This is a chance for you to find out about a prospective occupation or even a future employer. This is also an opportunity for future employers, customers or clients to find out about you. Even if you do not later work for your project company, your experience with them can help you get a good job and might help you do a good job.

This course is an opportunity for you to learn about the business world. Keep your eyes and ears open to your company's culture. Find out how the company has distinguished itself from its competitors, how it projects itself externally and how it views itself internally. To be successful in this course, your recommendations must be consistent with the company's strategy and culture. More than that, to be successful in your career, you must be sensitive to your employer's, your competitors' and your customers' corporate strategy and culture.

2 FACULTY ADVISORS

After your team has a project definition (Report 2), you will be assigned a faculty advisor. You are responsible for keeping your advisor informed of your intentions and progress. You may, however, call upon any of us or any other faculty for advice and assistance.

3 PROJECT TEAMS

You are free to form your own project teams of four members. Remember that in joining a team you are committing to carry your share of the responsibility and in asking someone to join your team you are accepting responsibility for the quality of his or her work. Your advisor is not responsible for browbeating laggards into shape. If your team members do not carry their share of the load, you will have to carry it for them.

On the first day of class you must submit the list of team members (names and phone numbers). Designate one person to be the lead contact.

4 SELECTING A COMPANY & PROJECT

Each team must identify an institution and a suitable project. Choose your institution and your project carefully. This is a strategic decision. Remember, this course is a valuable opportunity to distinguish yourself. Do not throw it away by choosing a project haphazardly.

When looking for a project investigate as many personal contacts that you can. Consider your (or your friends) summer internships, coops, and current job search. Be creative in your search for projects. Consider less traditional areas of endeavor, e.g.

- Hospitals
- State and local governments
- Banks
- Charitable or non-profit organizations

We have known people to resort to the *Yellow Pages* and turn up great opportunities.

Once you have identified an organization, you need to contact an appropriate person within the organization. As a rule of thumb, it is better to reach too high into the management of the organization than too low. Higher level executives will have greater perspective, broader authority and easier access. Be extremely circumspect in all your communications. Initially, you will not know the corporate culture, so it is best to tread lightly and be extremely polite.

You are not under any obligation to accept a project, but be sure not to leave any loose ends. If you decide not to take a project be sure to thank – in writing – everyone you contacted and politely explain that you have found something else.

If you have trouble finding a project on your own, see Patti Parker in the Undergraduate Office; she maintains a book of letters from companies specifically requesting senior design groups. In addition, the professors directing this course may have potential projects.

Do your best to find a great project. As added insurance, you will submit two project descriptions. One designated as primary, and the other as a secondary project. You will prepare both projects for presentation. The group of faculty advisors must approve your project before you can proceed. Simply picking a company that you like is not the end of the story. Guidelines for Report 2, due Monday, 13 April 1998 are attached.

We expect you to spend at least 9 hours on this project each week for the next two quarters. That comes to about 200 hours for each team member or 800 hours for each team. This represents about 40% of one full-time working year. A junior industrial engineer costs approximately \$60,000/year including benefits,

etc. So, your efforts should add around \$25,000 to the value of your company. This should give you some guidance as to the kind of project you are looking for.

5 PREPARING THE PROPOSAL

Attached is a guideline format for Report 3, the Project Proposal. Your proposal will be regarded as a “contract”, and you will be expected to perform as promised both by your company and by your faculty advisor.

6 RELATIONSHIPS WITH COMPANIES

The project will require considerable time and effort from employees of your company. This represents an expense. Nevertheless, companies participate in these projects for three reasons:

1. they expect to receive valuable assistance,
2. to express good will toward Georgia Tech and its students, and
3. to promote your education so that industry may benefit from more capable young engineers.

ISyE project teams must behave professionally and reinforce that feeling of good will.

Students are not allowed to receive compensation for work done in ISyE 4104–5. Companies may provide assistance in the form of photocopying and typing services, and in some cases, supplies and travel expenses.

We recommend you give your company a copy of this entire handout.

Once again, settle all contacts you make with prospective firms. Once you decide on your project, write the other firms you have contacted to inform them that you will be unable to work with them, and thank them for the cooperation and time they have given you.

7 ACT AS PROFESSIONALS

You should function as if you were an employee reporting to your faculty advisor and to your corporate contact. Some guidelines are:

- Your client’s best interests should be your paramount concern.
- You should apply the technical methods of ISyE thoroughly, accurately, honestly and in a manner appropriate for the task at hand.
- You should dress neatly and appropriately for the occasion.
- You should always be prompt and punctual.
- You should write clearly and type all reports.
- Long reports should include a title page, table of contents and page numbers.
- Your drawings should be neat, clean, properly titled, and scaled.
- You should keep a copy of everything you give your faculty advisor or client.
- You should keep well organized records of all your work.
- You should date all your reports and correspondence.
- You should appropriately acknowledge everyone who assisted you in your efforts.
- You should be honest in your dealings with colleagues and clients.

8 THE CHALLENGE OF DESIGN

The Senior Design sequence is probably the most valuable course in the curriculum. It is also one of the most difficult. Your problems will not be clearly defined, relevant data will be unavailable or hard to obtain, the proper analysis techniques may not be apparent, solutions will not be exact, and you will disagree about the right course of action. After working two months on a project you may discover you are on the wrong track and that the real problem lies elsewhere.

This is your challenge. You will face situations unlike those presented in textbook examples. You will need to recall material from the many courses you have taken at Tech and your faculty advisor will expect you to demonstrate competence in all of them. On top of this, You will have to learn new material not covered in your courses.

Above all, you will be evaluated on how effectively you work, not how hard you work. Your contribution will be measured in terms of the value it adds to the project, not in terms of the hours you spend on it. So, you must not only work hard, you must also work smart.

9 GRADING

Your faculty advisor will grade your team. Factors determining your grade include:

- a. The value your project has added and the professional level of your results. (Your faculty advisor should elicit your corporate contact's opinions of this.)
- b. The quality of your presentations.
- c. The quality of written reports.

Note that it is very important that your reports and presentations be of high quality, so spend the time and effort to do these well. We anticipate you will invest nearly one third of your time preparing reports and presentations.

10 INFORMATION FOR SPONSORS

10.1 The Senior Design Sequence

For many years all senior students in the School of Industrial and Systems Engineering have culminated their undergraduate educational experience with the six-month sequence of senior design courses ISyE 4104–5.

Many enterprises in the Atlanta area have cases that can be successfully studied and solved by a small group of industrial engineering students working for experience and academic credit instead of money. Our hundreds of 'satisfied customers' include a majority of the well-known businesses in the Atlanta area, and other enterprises such as hospitals and various local city and county government departments.

Student groups work as unpaid outside consultants satisfying their interest in a real world design experience. They work on well-defined, specific design activities. Each group spends between 800 and 1000 hours on the project over the course of six months. This effort is focused on resolving a specific problem or completing a specific project and is not intended for carrying out day-to-day operations.

10.2 What the Sponsor Does

The first step is for the sponsor to identify a need or opportunity. For example, one year Rich's felt their delivery truck fleet could have better maintenance scheduling; the downtown Marriott felt the need for a more consistent, fair and profitable parking policy; Selig Chemical saw the need to organize their warehouse more efficiently; the Atlanta Journal and Constitution felt its wastage of newsprint paper could be reduced by a few tons per year; the Bairstow Distributing Company realized they needed to computerize their

inventory system; and Rollins Security found their service people could travel a lot less if their trips were better scheduled. When students contacted these enterprises, they found enthusiastic potential sponsors. ISyE students are well prepared to design maintenance schedules, routing and delivery systems, warehouse layouts and materials handling systems, waste control programs, and requirements and specifications for information systems. They can apply operations research, simulation, statistics, and other technical tools to a wide variety of problems, and they can back up their design choices with thorough economic analysis.

The steps in participating are:

- Meet with the student group to explore possibilities, and determine, loosely, what kind of beneficial project could reasonably be performed by a neophyte consulting group of industrial and systems engineers — four students working for about 200 hours each, over six months.
- Assign a responsible technical or managerial person to give the group guidance, operations and economic information, and plant access. During the six months, this person will probably spend two or three hours a week interacting with group members.
- Arrange for an appropriate management level to receive and consider the group's formal proposal (1 month), interim report (3 months), tentative results and conclusions (4.5 months) and final design (6 months).
- Participate in evaluating the students' work.

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Report 1
Project Team**

Designate team's lead contact with *.

NAME	TELEPHONE	BOX NO.	E-MAIL
1.			
2.			
3.			
4.			

Will all team members enroll in ISyE 4105 during Winter Quarter 1996?

ISyE 4104
Spring 1998
Guidelines for Report 2
Project Definition

Cover Page:

- Team number
- Team member names
- Organization name
- Organization business address
- Main contact person name
- Main contact person position
- Main contact person telephone number

Description of the organization Where is the organization's headquarters? What kind of business is the organization in? How many people does it employ? Other measures of size, for example annual revenues, market share, annual profits, etc. Similar information about the department you will work with directly.

Description of problem symptoms Be careful to describe a problem, not a solution. For example, "The department needs a new conveyor system" is a poor problem description. A better description would explain the difficulties leading to the conclusion that the company needs a new conveyor system.

Design objective Describe what you hope to accomplish for the company. Be careful not to get locked into foregone conclusions. For example, "Identify the new conveyor system to purchase" is a poor design objective – a better resolution of the problems may simply involve clever adjustments to the existing system. On the other hand, be sure to have clear, attainable objective: "Solve the company's problems" is not a good design objective either.

Team information Attach résumés and current schedules.

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Guidelines for Report 3
Project Proposal

In the past we have offered detailed outlines for this report with the rather undesirable effect that all the proposals looked alike and few were very good. To remedy this, we offer the following broader guidelines.

Whenever you write be sure to have an audience in mind. Whom are you writing to? Identifying your audience for this report is a bit challenging. In fact you are writing to two very different audiences: your corporate contact (first) and your faculty advisor (second). This causes some peculiar difficulties. For example, although your corporate contact knows more about the company than you do, your faculty advisor does not. On the other hand, while your faculty advisor may be very familiar with some of your proposed methods, your corporate contact may not be. You should include all the information for both audiences, but organize it so that each reader may easily find the material of interest to him. When you describe the organization, for example, write to your faculty advisor, but remember that your corporate contact will be looking over your shoulder. When you describe your methods, on the other hand, write to your corporate client, but remember that your faculty advisor will be looking over your shoulder.

Once you have identified your audience, you need to figure out what you want to tell him and how you are going to say it. This is the hard work of writing. You must organize your thoughts and pick your words so your ideas are clear and easy to follow. If your ideas are not clear or you do not have any ideas at all, your writing will be difficult to follow. Conversely, if your writing is difficult to read

So, to the heart of the matter. Your proposal should begin with a cover letter to your corporate contact thanking him for suggesting the project and indicating your desire to work on it. In a sense this letter is a formal request for your contact to accept your proposal as a binding contract. You are bound to do the work described in the proposal and your contact is bound, albeit with less dire consequences to him if he fails, to provide the support you specifically request.

The proposal, then, must accomplish two things: It must spell out your expectations from the company (Please discuss these with your contact before putting them in the proposal) and it must spell out what the company can expect from you in return (Please discuss these with your faculty advisor before putting them in the proposal).

After the cover letter, you should probably include a project summary that provides a one or two page overview of the project intended for, say, higher level executives who are interested, but do not have time to read the whole proposal. We recommend you include an executive summary like this in all of your reports.

The main body of the proposal should probably begin with a description of the organization your working with (for the faculty advisor) and a brief description of Senior Design (so the company knows what this is all about). Your description of the organization should focus in on the department you will be working with. Next, describe the problem in some detail. Provide quantitative evidence of its magnitude and significance whenever possible.

At this point you are ready to describe what the company can expect from you. Begin with a very brief objective, but follow this up with any supplemental information necessary to delineate the project. Include a detailed description of your “deliverables”. For example, will you be delivering production code, a working system, a prototype or specifications? Will you provide a method to solve the problem whenever and where ever it arises or will you simply solve the present problem? Estimate the likely benefits to the company. Remember these should be worth around \$25,000, but do not promise what you cannot deliver. In fact, you want to avoid the tragedy that will certainly arise if the company expects more than you give.

Provide evidence that you know how to accomplish all that you promise. Describe the specific steps you will take and give a credible schedule of when you will complete them.

Describe what you expect from the company. Be sure to discuss each item in detail with your contact before you include it in the proposal. Try to anticipate the kinds of assistance and information you will need

and the form you will need it in. Do not get caught in the position of needing key information to complete your project only to discover half way through that it simply is not available!

In summary, your proposal should include:

- A cover letter
- A project summary
- A description of the company and of senior design
- A description of the problem
- A description of the deliverables and estimates of their value
- A description of what specific steps you plan to take along with a schedule
- A description of what you will require from the company

**ISyE 4104
Spring 1998
Schedule**

Date	Day	Activity	Class Meeting	Oral Presentation	Written Report
April 1	W	Course Organization	X		R1
April 3	F	Project Location Visits			
April 6	M	Project Location Visits			
April 8	W	Project Location Visits			
April 10	F	Project Location Visits			
April 13	M	Project Definition	X	Class	R2
April 15	W				
April 17	F				
April 20	M				
April 22	W				
April 24	F				
April 27	M				
April 29	W				
May 1	F				
May 4	M				
May 6	W				
May 8	F				
May 11	M	Project Proposal	X	Class & Client	R3
May 13	W				
May 15	F				
May 18	M				
May 20	W				
May 22	F				
May 25	M				
May 27	W				
May 29	F				
June 1	M	Interim Report	X	Class & Client	R4
June 3	W				
June 5	F				

Reports Are:

R1 - Team Data - due 4/1

R2 - Project Definition (2-3 pages) - due 4/13

R3 - Project Proposal (10-15 pages)

R4 - Interim Report