

Internships and Co-op Program

Department of Chemical Engineering and Materials Science

(Note: The Internship/Co-op program may be changed in the future, including the addition or deletion of requirements. Rev'd. 1/12/2009)

Overview

The Department of Chemical Engineering and Materials Science (CEMS) supports both Industrial Internships and Co-op Industrial Assignments for qualified third and fourth year undergraduate students in Chemical Engineering and in Materials Science and Engineering programs. In doing so, the Dept. recognizes that valuable educational experiences may be gained during a period of full-time industrial employment in a setting that involves the application of chemical engineering and/or materials science principles. Academic credits that can be applied toward technical elective requirements may be earned. An Internship differs from a Co-op primarily in the length of the employment period. A Co-op is intended to comprise approximately 1 year of industrial employment, typically in 2 segments that would include a Fall semester, a Spring semester and a Summer term. An Internship is a shorter period of full-time employment, but at least 3 months (e.g., a Summer term) and up to 8 months (e.g., Spring semester plus Summer term).

Students may earn academic credit for their Internship or Co-op work experience by registering for and completing the appropriate ChEn or MatS courses. Further information about these courses is given on pages 5-6 for Internships, and on pages 9-10 for Co-ops. Up to 2 credits of Internship or up to 4 credits total from either a Co-op or a combination of Co-op and Internship experiences may be applied toward technical elective credits in their academic programs.

For further information, interested students should contact the Faculty Internship/Co-op coordinator (FI/CC), currently Prof. David A. Shores, or your Director of Undergraduate Studies. The Department encourages students to seek

professionally meaningful employment during their summer terms. The Internship and Co-op programs do not restrict in any fashion student employment opportunities if no academic credit is sought.

Reminder List applicable to both Internships and Co-ops

1. File resume with I. T. Career Services and interview companies.
(International students obtain permission(s) from ISSS office.)
2. Accept full-time employment for internship or Co-op.
3. Submit *student application* to FI/CC (currently, Prof. Shores).
4. Register for ChEn/MatS 3041, 3045, or 4041, as appropriate (obtain permission number from Prof. Shores).
5. File change of student status form with I. T. Student Affairs office.
6. Make tentative class schedule to complete degree program. (see DUS)
7. Begin full-time industrial work assignment.
8. After two weeks, submit and obtain approval of *Proposed Work Plan*.
- 9a. At end of internship submit *Final Report* for ChEn/MatS 3045 (1-2 cr.), or
- 9b. At end of first semester of Co-op submit Interim Report for ChEn/MatS 3041 (2 cr.).
- 9c. At end of Co-op assignment submit Final Report for ChEn/MatS 4041 (2 cr.).
10. Complete academic degree program.

Internship Program

Requirements:

- Upper division undergraduate status in good standing,
- Completed all the program course requirements for years 1 and 2 for the Chemical Engineering or Materials Science programs; this includes:
 - all first and second year mathematics,
 - general chemistry and first semester organic chemistry,
 - general physics
 - computer applications course,
 - MatS 3011
 - other program-specific courses
 - at least 5 of 7 liberal education elective courses.
- Cumulative grade point average of 2.80.
- Bona fide offer of full-time industrial employment for an appropriate length of time.
- International students must meet INS eligibility requirements and must secure approval from the University office of International Student Scholar Services prior to accepting a job offer. International students should contact the I.T. Career Services office for further information.
(Note: Summer research programs at the University, and part-time industrial employment are specifically excluded from the Internship program.)

Process for setting up an internship

1. Students must secure an offer of full-time industrial employment. The I. T. Career Services office in Lind Hall can assist a student with identifying potential employers and arranging interviews.
2. Students must submit a **Student Application** (attached) to the FI/CC (currently Prof. Shores) after they have received an offer of employment, and before they begin work.

3. During the first two weeks of employment, the student, together with his or her supervisor, must prepare a Proposed Plan (see below) and submit it to the FI/CC.

If an internship includes a Fall or Spring semester, students should file the appropriate form with I. T. Student Affairs office to maintain their student status during the internship period. This form should be filed before leaving campus. If the student registers for credits, e.g., ChEn 3045, the appropriate form is “Request for Reduced Credit Load”; if the student does not register for credits, use the “Leave of Absence” form. Both forms are available in 128 Lind Hall or on-line at: “request for reduced credit load”:

http://onestop.umn.edu/onestop/img/assets/9061/part_time_petitions.pdf

or “leave of absence”:

http://onestop.umn.edu/onestop/img/assets/9061/OTR007WEB_Leave_of_Absence.pdf

The purpose of the Proposed Plan document is to broadly describe the work assignment and to identify the educational elements that are intended as part of the work assignment. (See the next section for a discussion of Educational Elements.) For students registering for ChEn/MatS 3045, it is primarily the educational elements that can qualify for academic credit. It is crucial that the Proposed Plan be approved by the FI/CC (currently Prof. Shores) early in the employment period, so that any changes, if needed, can be made. This process is intended to ensure that the employer has a clear understanding of the Department's expectations, which primarily are that the work assignment contains appropriate engineering content. It is not the intention of the Department to direct or interfere with the employer's work plan. A faulty Proposed Plan that is submitted after the completion of the employment will generally not be accepted, and a petition for academic credits will be denied.

In the semester of the internship, or in the next semester after the internship employment is completed, the student may register, with the permission of the Faculty Internship coordinator, for the Internship course: ChEn 3045 for 1 or 2 credits. One credit will be available for employment periods of 3 to 5 months; up to 2 credits will be available for employment periods of 6 to

8 months. ChEn/MatS 3045 has two requirements: the preparation and submission of an acceptable Proposed Plan, and the preparation and submission of a report describing the student's employment experiences, giving particular emphasis to educational elements complementing their in-class learning. The report should describe in general terms the engineering work that was done, but must not contain proprietary information; therefore, the report must be reviewed and signed by the student's industrial supervisor prior to submitting it to the Faculty Internship coordinator. The report will be graded by the FI/CC (currently Prof. Shores), or by a member of the faculty with experience in the technology involved in the Internship work assignments. (See below for suggestions about the format of the report.) No more than 2 credits may be applied toward technical elective requirements.

Examples of Educational Elements

"Educational elements" are learning experiences that contribute to professional development, but are outside the content typically offered in the academic program classes. These could include:

- Dynamics of team projects - how information flows between team members, what drives scheduling, what is the role of financial analysis?
- "Corporate culture" - the management process, what motivates engineers and managers, how individuals operate within the system, how work is evaluated?
- What role does engineering ethics play in work decisions?
- Interactions with non-technical groups: sales, marketing, accounting, purchasing, customer service;
- Experience with new instrumentation, new equipment, large-scale equipment;
- Project management: how are objectives defined, timelines set, how are adjustments/corrections made?
- Quality control: use of a formalized program, how are product improvements or product design changes organized?

This list is not exhaustive, and some of the above examples may not apply to all Internships.

Suggested format for Report

1. Title page should contain the following information:

Title of project:

Time span of the internship, e.g, from mo/yr – to – mo/yr

Author:

Author's email address:

University of Minnesota course for which the report was prepared:

Supporting Company or Organization:

Supervisor: (underneath the line for the supervisor's signature should be a statement, such as: "I signify approval of this report for public release.")

Date of submission of the report:

2. Executive Summary

3. Engineering or Technical Activities

4. Educational Elements

5. other sections as needed, e.g., References,

6. The length of the report should be less than 10 pages, excluding title page, appendices and attachments.

Course Description:

ChEn 3045, Industrial Internship (1-2 cr)

A-F only, prereq Proposed plan approved by FI/CC (currently Prof. Shores) ,
report signed by industrial supervisor describing engineering work completed, 1 -
2 credits

Co-op Industrial Program

Overview

The Department of Chemical Engineering and Materials Science (CEMS) initiated an Engineering Co-op Program in January, 2000. The principal objective of the program is to allow qualified third and fourth year students to gain relevant industrial experience during their University studies. We believe that observing professional engineers at work and practicing engineering work themselves in an industrial setting will help make the student's academic studies more meaningful and will help prepare them for the practice of their profession. Solving practical problems by the application of fundamental principles and understanding is the essence of Engineering.

As with the Internship program, it is expected that the Co-op work experience will provide learning opportunities that complement classroom learning. It is for this component of the work experience that the Department can offer academic credit. The longer work period (compared to an Internship) often allows the company to expose the Co-op student to more than one type of work, e.g, production and R and D. Companies also expect a more in-depth involvement with, and real contribution to, assigned projects. Students should also be aware that the company may also be evaluating them for future employment.

Requirements

A student applying for the Co-op program must meet several requirements:

- Upper division undergraduate in good standing and enrolled in the Chemical Engineering or Materials Science program,
- Completed all the program course requirements for lower division plus Fall semester of year 3. As course numbers and course requirements may change from time-to-time, students should refer to the specific program that applies to

them. Generally this is the course requirements in effect at the time they entered the program.

- Completed at least 5 of 7 liberal education elective courses.
- Cumulative grade point average of 2.80, or higher.
- Bona fide offer of full-time industrial employment for an appropriate length of time.
- International students must meet INS eligibility requirements and must secure approval from the University office of International Student Scholar Services prior to accepting a job offer. International students should contact the I.T. Career Services office for further information.

Process for Setting up a Co-op

Scheduling

The Co-op student will work full-time for approximately 1 year, comprising a Fall semester, a Spring semester and a summer term. It is unrealistic to plan to take university courses during the Co-op work period (except for the Co-op Industrial Assignment courses, see below). The student should prepare a plan that efficiently integrates Co-op work periods with University study periods, recognizing that departmental courses are offered once per year, and that some courses may be sequential. If the Co-op work period is continuous (i.e., Spring semester - summer - Fall semester, or Fall semester - Spring semester - summer), the student can easily re-enter his or her program and continue until graduation. Alternatively, if the Co-op assignment is carried out in two separate segments, e.g., Spring semester (3rd yr) and Summer term, then return to school for two semesters, then a Fall semester work segment, the student must plan his or her schedule of departmental courses carefully to avoid being excluded from certain courses because they are out of sequence or haven't completed the pre-requisites. See your faculty advisor or your Director of Undergraduate Studies for scheduling questions. A full-time student, i.e., one who progresses on their academic program at approximately 16 credits per semester, should be able to do a Co-op program and finish their B. S. degree in 5 years. The degree requirements of 128

credits and completion of certain required courses is unchanged for Co-op students.

Because a Co-op typically will include a Fall or Spring semester, students should file the appropriate form with the I. T. Student Affairs office to maintain their student status during the off-campus period. This form should be filed before leaving campus. It is recommended that students register for the appropriate Industrial Assignment course (see below), in which case the appropriate form is “Request for Reduced Credit Load”. If the student does not register for credits, use the “Leave of Absence” form. Both forms are available in 128 Lind Hall or on-line at: “request for reduced credit load”:

http://onestop.umn.edu/onestop/img/assets/9061/part_time_petitions.pdf

or “leave of absence”:

http://onestop.umn.edu/onestop/img/assets/9061/OTR007WEB_Leave_of_Absence.pdf

Co-op courses

During each semester (not during the Summer term) that the Co-op student is on industrial assignment, he or she should register for and complete a two-credit course related to their industrial experience. Materials Science students should register for MatS 3041 during their first semester and MatS 4041 during their second semester; the corresponding courses for Chemical Engineering students are ChEn 3041 and ChEn 4041. There are no regularly scheduled meetings of the classes. There are two required assignments for MatS/ChEn 3041: the preparation and submission of an acceptable Proposed Plan, and the preparation and submission of a report describing their employment experiences, giving particular emphasis to educational elements complementing their in-class learning. For MatS/ChEn 4041, the requirement is a formal report on the industrial assignment. The report for each course is due at the end of the semester. More information about the report and a suggested format is given below. These courses provide a means for earning credits that may count toward the technical elective course requirement. Because the Co-op program is based on full-time employment, Co-op students are not allowed to

take other University classes without approval of the company and the Faculty Internship/Co-op Coordinator (FI/CC-currently Prof. Shores). Requests to take day classes will normally be denied by the FI/CC (currently Prof. Shores) unless there are exceptional circumstances. It should be noted that while on industrial assignment, Co-op students are considered part-time students and will not be eligible for certain University benefits and privileges, such as financial aid.

Course Descriptions

ChEn/MatS 3041, Industrial Assignment-I (2 cr)

Credit will not be granted if credit has been received for: MATS 3041, A-F only, prereq ChEn upper Div, completion of required courses in ChEn prog through fall sem of 3rd yr, GPA of at least 2.80, registered in Co-op prog, 2 credits

Catalog description: First Industrial Assignment in Co-op program. Prepare formal written report on first semester's work assignment.

ChEn/MatS 4041, Industrial Assignment-II (2 cr)

Credit will not be granted if credit has been received for: MATS 4041, A-F only, prereq 3041, completion of required courses in ChEn prog through fall sem of 4th year, GPA of at least 2.80, registration in Co-op prog, 2 credits

Catalog description: Second Industrial Assignment in Co-op program. Prepare formal written final report on Co-op work assignment.

Guidelines for Reports

At the end of each semester of the industrial assignment, the Co-op student must prepare and submit a written report about his or her work experience to the FI/CC (currently Prof. Shores). The report will be graded by either the FI/CC or a CEMS faculty member with expertise in the technical area of the work assignment. The grade for the course will be based primarily on this report and will consider the evaluation of the student by his or her immediate supervisor.

The report should address two topics. First, there should be a brief description of the technical work and a summary of what was accomplished. Where possible, the student should identify relationships of the work with

academic courses the student has completed. Second, the learning experiences, or educational elements (see examples in the Internship section), that complement academic courses should be described. Since these are a principal basis for awarding academic credit for the Co-op program, this section must clearly identify these experiences and include some specific details and examples. The student should also compare their experiences with what was anticipated in the Proposed Plan prepared at the beginning of the work assignment.

The report must contain no proprietary information; therefore, it must be approved by the student's company manager before being submitted to the FI/CC (currently Prof. Shores). The report should be prepared to "professional standards", i.e., it should be clearly written at a level an informed engineer can read and understand. Avoid jargon and excessive use of abbreviations. If the student has prepared a final report for the company that the company will release for public distribution, this document may be attached as an appendix and can serve as the first topic. The report will not be accepted by the FI/CC without an appropriate description of both the technical work and the non-technical learning experiences.

Suggested format for Report

1. Title page should contain the following information:

Title of project:

Time span of the internship, e.g, from mo/yr – to – mo/yr

Author:

Author's email address:

University of Minnesota course for which the report was prepared:

Supporting Company or Organization:

Supervisor: (underneath the line for the supervisor's signature should be a statement, such as: "I signify approval of this report for public release.")

Date of submission of the report:

2. Executive Summary

3. Engineering or Technical Activities

4. Educational Elements
5. other sections as needed, e.g., References.
6. The length of the report should be less than 10 pages, excluding title page, appendices and attachments.

Application Procedures

Information for companies

The Department wishes to maintain high standards that benefit both student and company. In general, the industrial assignment should combine: (1) a learning experience for the student, and (2) accomplish meaningful engineering tasks for the company. The learning experience should include: (a) the application of science and engineering principles to the practice of engineering, and (b) non-engineering issues such as management, teamwork and communications. It is expected that a participating company will offer full-time employment to the Co-op student during the period of the industrial assignment.

Companies wishing to hire Chemical Engineering or Materials Science undergraduate Co-op students may contact the CEMS Co-op office at 612-625-0014 to discuss potential Co-op work opportunities, company and Departmental expectations, scheduling and other issues. The I. T. Career Services office (612-624-4090) is well set up to assist in forwarding resumes of interested students to companies and in arranging on-campus interviews. Prospective Co-op students will sign up for interviews through the I. T. Career Services office. The CEMS Co-op office can also assist in arranging interviews with prospective Co-op students. The responsibility for interviewing Co-op companies through the I. T. Career Services office and for obtaining employment rests with the student. The student's immediate company supervisor will be asked to assess the ability of the student to apply his/her academic learning to the company's technical problems and to comment about the student's job performance.

Action Required of Students

CEMS students wishing to be in the Co-op program should submit a resume to the I. T. Career Services database for the purpose of interviewing companies unless they have obtained a job offer through other channels. The eligibility requirements for students were listed above. As soon as an offer of employment for a Co-op position has been accepted, the student must submit a Student Application form (attached below) to the Co-op office. Approval for admission to the Co-op program requires, in addition to meeting the requirements set out above, that an appropriate work plan is agreed upon by the company, the student and Co-op coordinator, as described in the next section.

Joint Action Required of Student and Company

Within two weeks of beginning a work, the student and company representative must jointly prepare a Proposed Plan that describes the work assignment in general terms. This work plan should be a brief generic discussion of the technical or engineering aspects of the work, and it should suggest what learning experiences are planned. Some examples of learning experiences have been listed earlier on page 5 in the section titled “Educational Elements”, under Internships. This proposed work plan should contain no proprietary information. It must be submitted to the FI/CC (currently Prof. Shores), and when the plan is approved, the student is officially registered as a Co-op student. The work plan should be updated and re-submitted if the student's work assignment changes significantly.

Student Application

Chemical Engineering and Materials Science

This application is for an Internship or a Co-op Program

Date _____

Name _____ Student I.D. # _____

Current address: _____

City _____ State _____ Zipcode _____

e-mail _____ Phone (day) _____ (evening) _____

When will you register for ChEn/MatS 3041? _____

Address at work (if known) _____

City _____ State _____ Zipcode _____

contact phone (if known) _____

work supervisor's name _____

Supporting documents:

(1) attach an unofficial transcript or APAS report to this application*.

(2) For international students:

(a) What is your visa type? _____;

(b) Have you obtained approval from the Office of International Student & Scholar Services ____ yes ____ no

(3) Other optional documents: (list)

Students must submit a paper copy of their application, with an attached APAS or unofficial transcript and any other needed documentation, to the Co-op coordinator's office: 108 Amundson Hall. **An application cannot be considered without a transcript or current APAS report.* The signature below certifies that this student meets the academic eligibility requirements of the CEMS Engineering Co-op program.

Coordinator