

**THE WALTER P. MURPHY COOPERATIVE
ENGINEERING EDUCATION PROGRAM**

EMPLOYER HANDBOOK

**NORTHWESTERN UNIVERSITY
ROBERT R. McCORMICK SCHOOL OF
ENGINEERING AND APPLIED SCIENCE**

THE MISSION:

To be an acknowledged leader in preparing, placing, and supporting diverse and talented Cooperative Education students in business, industry, and government as an essential part of the engineering education process.

THE GOAL:

Establish on-going relationships with small, mid-size and large organizations which provide Co-op experiences that increase in responsibility, challenge, and autonomy so that Co-op seniors are able to function at the level of newly hired engineers during the fifth and sixth work periods and pass the first Professional Engineering licensing exam on their first try.

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Dear Employer:

Thank you for your interest in the Walter P. Murphy Cooperative Engineering Education (Co-op) Program. Northwestern University has a rich history of cooperation with industry to educate future engineering leaders in business, industry, and government.

During the 1930's, Walter P. Murphy, a leading Chicago industrialist, gave Northwestern \$36,000,000 to fund a school of engineering and to require cooperative engineering education as a pedagogical experiment. Having collaborated with Dr. Charles Kettering, the premier technologist and inventor of the time as well as Chief Research Engineer for General Motors, and Dr. Herman Schneider, the "Father of Cooperative Education" and one of the most innovative engineering educators of the time as well as the Dean of Engineering at the University of Cincinnati, Mr. Murphy became convinced that cooperative education was a "superior form of engineering education."

Dr. Walter Dill Scott, president of Northwestern University at the time of Mr. Murphy's gift, stated in his biography of Mr. Murphy that "any one of these three [Murphy, Kettering, Schneider] might have been the first to recognize that industry furnishes a training laboratory for engineers which no college can equal. Actually, Herman Schneider was the first to make this idea the basis of engineering education. Charles Kettering was the first to make it respected by the industrial leaders in America. Walter Murphy was the first, and only, individual to be willing and able to subsidize a conclusive experiment in cooperative education.... As a result, the Murphy gift was the largest contribution ever made by any one person in America to a single institution in support of training and research in one field of learning" (Scott, 1952, p. 92).

Since 1939, Northwestern University has continuously maintained a Co-op Program to serve students and employers. Today our alumni are CEO's, presidents, and senior executives in almost every business, industry, and organization.

At Northwestern, Co-op is an educational program, not a "jobs" program. It allows undergraduate students in engineering to alternate periods of academic study with full-time periods of paid work experience related to their academic and professional goals. We are pleased that you are interested in the program and we invite you to join us in the education of a new generation of engineers.

If you have questions or require further information, please do not hesitate to contact me. We appreciate your time and consideration and look forward to working with you to build a strong, mutually beneficial relationship.

Sincerely,

Helen Oloroso
Assistant Dean and Director of Cooperative Education Program

THE VALUE ADDED ASPECTS OF THE CO-OP PROGRAM

Co-op offers employers options not found through traditional recruitment efforts:

- * A "recruitment pool" of knowledgeable, highly qualified individuals who perform their jobs with enthusiasm and professionalism;
- * The opportunity to evaluate the potential of Co-op students for permanent employment;
- * Improved cost/benefits in recruitment and training;
- * The flexibility to free permanent employees for higher level work by assigning Co-op students to pre-professional tasks;
- * Continual contact with the University and access to other programs and recruitment opportunities.

Backed by a Northwestern University education, Co-op students are motivated and quick learners. They deliver quality performance and are an asset to the work place.

PARTICIPATING ACADEMIC DEPARTMENTS

ACADEMIC DEPARTMENTS	AREAS OF CONCENTRATION	CHAIRMEN or AREA LEADER
Applied Mathematics	<i>Engineering Applications Pure and Applied Math Computer Science Operations Research</i>	Dr. Alvin Bayliss Chairman
Biomedical Engineering	<i>Biomedical Instrumentation Biomechanics Biotransport Processes Biotechnology Biomedical Signals</i>	Dr. Matthew R. Glucksburg Chairman
Chemical Engineering	<i>Chemical Process Engineering Biomedical Engineering Biotechnology Environmental Engineering Polymer Science and Engineering Process Control and Simulation</i>	Dr. William Miller Chairman
Civil Engineering	<i>Applied Mechanics Structural Engineering Geotechnical Engineering Environmental Engineering Transportation Systems Construction</i>	Dr. Hamlin Jennings Chairman
Computer Engineering	<i>Computer Architecture and Systems Design Distributed and Parallel Computing VLSI and Computer Aided Design Embedded Systems Design</i>	Dr. Prithviraj Banerjee Chairman
Computing and Information Studies	<i>Database and Information Retrieval Systems Programming Theoretical Foundations Computer Hardware and Architecture Numerical Analysis Artificial Intelligence</i>	Dr. Prithviraj Banerjee Chairman

PARTICIPATING ACADEMIC DEPARTMENTS

ACADEMIC DEPARTMENTS	AREAS OF CONCENTRATION	CHAIRMEN or AREA LEADER
Computer Science	<i>Artificial Intelligence Theoretical Computer Science Software Engineering Human Computer Interaction Distributed Interactive Systems</i>	Dr. Ming-Yang Kao Chairman
Electrical Engineering	<i>Communication Systems Control Systems Electronic Circuits Electromagnetic Waves and Devices Optoelectronics Solid-State Electronics Biomedical Engineering</i>	Dr. Prithviraj Banerjee Chairman
Environmental Engineering	<i>Environmental Biology and Chemistry Industrial Hygiene Radiological Health Water and Waste Treatment Construction & Operation of Environmental Processes</i>	Dr. Hamlin Jennings
Industrial Engineering and Management Science	<i>Production Scheduling / Planning Logistics Inventory Control Operations Research Simulation Modeling Experimental Design / Statistics Organizational Behavior</i>	Dr. Ajit Tamhane Chairman

PARTICIPATING ACADEMIC DEPARTMENTS

ACADEMIC DEPARTMENTS	AREAS OF CONCENTRATION	CHAIRMEN or AREA LEADER
Manufacturing Engineering	<i>Manufacturing Management Manufacturing Logistics Microelectronic Systems Mechanical Systems Materials Engineering Environmental Issues Automation Systems Chemical Process Systems</i>	Dr. Bruce Ankenman
Materials Science and Engineering	<i>Biomaterials Electronic Materials Metals and Ceramics Polymeric Materials Surface Science</i>	Dr. Katherine Faber Chairman
Mechanical Engineering	<i>CAD / CA Manufacturing Systems and Control Robotics Tribology Aerodynamics Combustion Engines Environmental Control Biomedical Engineering Energy Conversion and Management Intelligent Mechanical Systems Manufacturing</i>	Dr. Brian Moran Chairman

TRADITIONAL NORTHWESTERN UNIVERSITY CO-OP SCHEDULE

	SUMMER	FALL	WINTER	SPRING
	Mid June to Mid Sept	Mid Sept to Mid-End Dec	Jan 2 - Mid March	Mid March - Mid June
FRESHMEN YEAR		SCHOOL	SCHOOL	SCHOOL
SOPHOMORE YEAR	SUMMER JOB	SCHOOL	SCHOOL	SCHOOL
JUNIOR YEAR	CO-OP or (SUMMER JOB)	SCHOOL	SCHOOL	CO-OP
PRE-SENIOR YEAR	CO-OP	SCHOOL	CO-OP	SCHOOL
SENIOR YEAR	CO-OP	CO-OP	SCHOOL	SCHOOL/ GRADUATION

CO-OP SCHEDULE REQUIREMENTS:

1. A minimum of **12 months (four quarters)** of work with the same employer is expected for each co-op student.
2. Each co-op student's schedule should have at least **one SIX MONTH** (two quarters) work term, in order to provide a more in-depth experience for the student and greater productivity for the employer.
3. Each co-op student's schedule should include at least one work term for each season or academic quarter. In other words, the student should work at least **one fall, winter, spring and summer quarter**.
4. The schedule **must alternate** terms of work and school in approximately equal intervals.

RECRUITING POLICIES

In order to recruit co-op students from Northwestern University's co-op program, the following policies must be observed:

1. Employers must be able to sustain a co-op position with assignments that are progressively more challenging and carry greater responsibility over the duration of the twelve to eighteen months of the student's co-op schedule.
2. Each student must have clearly defined job responsibilities for each work term, and must be evaluated by the supervisor according to those responsibilities at the end of each work term.
3. The student's progress (or lack of progress) is to be communicated to the co-op office at Northwestern University in a timely way so that the issues can be addressed through the advising process.
4. The person completing the evaluation is to discuss the evaluation with the student and use it as a tool for the student's learning experience.
5. No student is to be asked to sign a NON-COMPETE agreement at any time during his/her cooperative education schedule.
6. Students may be expected to sign a confidentiality or non-disclosure agreement.
7. Employers must comply with Northwestern University's policy of non-discrimination:
"It is the policy of Northwestern University not to discriminate against any individual on the basis of race, color, religion, national origin, sex, sexual orientation, marital status, age, disability, or veteran status in matters of admissions, employment, housing or services or in the educational programs or activities in operates, in accordance with civil rights legislation and University commitment."

RECRUITING PROCEDURES

The Northwestern University co-op program uses a secure on-line database management system to connect employers and students for co-op positions. The co-op office will provide you with a confidential access code for using the system from anywhere on the world wide web.

In order to recruit Northwestern University students for co-op positions in your organization, please take the following steps:

1. **Contact the co-op office** to express your interest in considering candidates for co-op.
2. **Send printed literature** and any relevant information that students can use for researching your organization.
3. The co-op office will help you **establish an on-line account** for accessing the student resume database.
4. **Reserve an interview date** and place (on our campus, at your site, or via video conferencing).
5. **Post your job(s)** on-line on our website.
6. **Review resumes** of qualified students on our website.
7. **Select candidates** for interviewing.
8. Contact the co-op office to **create an interview schedule**.
9. The co-op office notifies selected candidates for the interview schedule.
10. Students sign up for interview time slots.
11. **View your interview schedule** on-line as it is developing.
12. **Conduct the interviews**.
13. **Extend offers** (via an offer letter, copied to the co-op office)
14. Complete the organization's **hiring process**, notifying the co-op office of acceptances.
15. **Sign off** on the hired **student's Cooperative Education Degree Plan**, which outlines his/her schedule of school and work.
16. Proceed with the scheduled work terms, **evaluating the student's progress** in skill development at the end of each work term.
17. **Notify the co-op office** of any problems, changes to the work schedule, or other issues that might affect the organization's ability to maintain the program.

CO-OP SALARY OPTIONS

It is recommended that employers pay their Co-op students a percentage of the entry-level salary of a B.S. level engineer. This keeps the students' wages in line with other employees. It is not advisable to overpay or underpay Co-ops in relationship to the rest of the employer's work force.

Specifically, we recommend that first work period Co-ops be paid 60 percent of the entry level wage and that the salary be increased to 70 - 75 percent for the second and third work periods. In the final work period, it is recommended that Co-ops be paid 80 - 85 percent of an entry-level salary.

This plan allows the employer to make a significant increase in salary to the Co-op student upon graduation and still be within their existing pay scale. Increasingly, it has been observed that Co-op employers are offering signing bonuses to their Co-ops at the time of graduation. While this is not mandatory, it may increase the retention rate of Co-ops.

Information on salaries paid to new college graduates can be obtained from the co-op office.

Co-op raises are almost always tied to the completion of more education and given at the beginning of each work term. An analysis of our active employers indicates that Co-op raises tend to occur in one of two ways:

1. Employers with large Co-op programs have established pay rate for sophomores, for juniors, and for seniors. Raises are not given until enough course work is completed to move the student to the next class standing. (In these situations, NU students only get one raise during their Co-op experience because they typically do not begin a Co-op assignment until they have achieved junior status.)
2. Most Co-op employers tie Co-op pay increases to the completion of additional coursework. (In these situations, some NU students must provide transcripts upon return to work to document before they become eligible for a pay increase. Most employers take the student's word that they have completed one or two more quarters of work.)

It is our recommendation that Co-op students receive pay increases at the beginning of each work term, not each work quarter. We do never recommended increases midway through a six month work term. Our 6 month work terms approximate semester work terms and there are no pay increases midway through a semester work period; therefore, we would not expect employers to raise our Co-op students' salaries midway through a six month work term.

NORTHWESTERN UNIVERSITY

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WALTER P. MURPHY COOPERATIVE ENGINEERING EDUCATION PROGRAM

2145 Sheridan Road, Tech Room L364 Evanston, IL 60208-3122 Phone: 847/491-3366 Fax: 847/467-4727

EMPLOYER AGREEMENT FORM

Northwestern University's Cooperative Education Program follows guidelines set by the Accreditation Board for Engineering and Technology. In order to establish a mutual understanding of what our Program involves, please read the following guidelines and sign below. By signing this agreement you, the employer, agree to abide by these policies.

1. While admission of students to the Cooperative Education Program is the responsibility of the Walter P. Murphy Cooperative Education Program, the employer agrees to inform the Co-op Office of a student's work arrangements. These include hiring, discharge, evaluations, changes in schedule, etc.
2. *A minimum of four work terms (quarters) with the same employer is required* (assuming suitable performance, availability of budget/relevant work, and student not changing major). This minimum should be fulfilled with a combination of three- and six-month work terms. Since co-op is an academic program, start and end dates of work terms must follow academic quarters.

Co-op work periods are roughly designated as follows:

Fall quarter	September - December
Winter quarter.....	January - March
Spring quarter.....	March - June
Summer quarter	June - August

Changes to the student's schedule must have the consent of the work-place supervisor and the Co-op advisor.

3. The employer agrees to provide a minimum of twelve months of institution-monitored, full-time equivalent employment, based upon suitable student performance and availability of budget and relevant work (and assuming student does not change major).
4. The work provided to and expected from co-op students must be relevant to their academic programs, increasing in complexity and/or breadth as each student progresses through successive work terms.
5. The employer will submit an evaluation of student performance to the Co-op Office at the end of each work period, based on learning objectives established by student and supervisor at the beginning of each work term. Supervisors should discuss with the student their evaluation.
6. Northwestern will recognize the co-op status of only those students whose work experience is monitored by the Co-op Office.
7. No student will be required to sign any agreement that in any way restricts his or her ability to work for any other organization after graduation from Northwestern University.
8. The University acts in accordance with all federal, state, and local regulations regarding provision of equal opportunity in employment and education, insofar as those regulations pertain to Northwestern. Northwestern prohibits and will act to eliminate discrimination and segregation on the basis of race, color, sex, religion, national origin, age, veteran status, handicap or disability, or sexual orientation. The services of the Co-op Office are available only to employers whose employment practices are consistent with this policy and are similarly non-discriminatory.

Company Name (please print)

Co-op Student's Name (please print)

Company Representative Name (please print)

Company Representative Signature

Telephone

Date

Cooperative Education Evaluation Process

At the end of each quarter in which the student has worked, both the student and his or her supervisor will complete evaluations on-line. Both parties will be considering the same skill categories that are mandated by the accreditation standards of the Accreditation Board for Engineering and Technology.

Employers will be asked to assess the student's performance in each skill area as applicable to his or her job responsibilities.

Each student will be asked to rate the opportunity he or she has been given to develop and enhance these same skills through assignments at the work site.

The skills and learning opportunities to be evaluated are:

1. The ability to demonstrate an understanding of the technical aspects of the job.
2. The ability to schedule and organize work efficiently.
3. The ability to recognize and think through problems, obtain and evaluate relevant facts, generate alternatives, make sound conclusions and timely decisions.
4. The ability to apply knowledge of mathematics, science and engineering.
5. The ability to design and conduct experiments.
6. The ability to analyze and interpret data.
7. The ability to design a system, component or process to meet desired needs.
8. The ability to identify, formulate and solve engineering problems.
9. The ability to use techniques, skills and modern engineering tools necessary for engineering practice.
10. The ability to effectively communicate in writing.
11. The ability to effectively communicate orally.
12. The ability to develop original, workable solutions to problems.

Students are also evaluated in terms of the following items:

1. The quantity and quality of relevant work.
2. The ability to take independent action and to influence events to achieve results.
3. Their awareness of, and concern for others.
4. Their support for the team concept through their participation.
5. Their ability to work well with people of diverse backgrounds and styles.
6. Their diligence and enthusiasm with respect to work.
7. Their dependability and maturity.

For Further Information. . . .

Contact:

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