

Recruiting and Retaining Faculty and Managing Diverse Majors in Four Year Schools of Engineering Technology

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Abstract

With the proliferation of four engineering technology (ET) degree programs and an increase in the number of enrolled students^{1,2}, as well as an increase in the number of Baccalaureate Degrees being awarded from ET programs³, college administrators are faced with the task of attracting and retaining quality faculty for a diverse range of programs. The range of these programs has increased over the last several years to include majors in chemical, mechanical, audio, computer, marine, and civil engineering technology. Often times, it is difficult to keep full time faculty since the pay ranges are typically lower and the workloads are typically greater than in engineering programs. In addition, technology faculty must constantly stay abreast of the latest trends in their given fields, which are advancing at an astonishing rate. Therefore, many of today's four year ET schools must rely on a combination of highly competent full-time faculty, as well as adjuncts which are customarily retained from industry. In addition, diverse programs at schools of technology, which usually have limited enrollments, must rely not only on courses specifically offered in the given major, but also courses from across the parent institution, in order to stay economically viable. These programs must also be carefully managed in terms of scheduling to address the needs of a critical part-time student body, which usually comes from industry and must take night courses. The tactics used in composing a target faculty structure and recruiting the proper personnel will be discussed. The Mechanical Engineering Technology major at Ward College will also be analyzed as a model for orchestrating the careful balance between full and part-time faculty, courses from within the major verses courses from the greater University, and the strategy of evening verses day class scheduling.

I. Recruiting and Retaining Full and Part-Time Faculty

The education of the technology student in the 1990's is different from earlier years; it not only demands academic excellence on the part of the faculty, but also current, relevant industrial expertise. There are three basic types of faculty with that experience.

- (1) Full-time faculty with past industrial experience
- (2) Full-time faculty that work part time as consultants and
- (3) Adjunct faculty that work in industry full time.

Full time faculty must form the nucleus of a given technology major since they provide the “home base” for the students in the major. Of the two types of full-time faculty listed above, those with past industrial experience can use their acquired skills in a variety of ways. A primary duty is to constantly refine and revise the program to meet the latest needs in industry. They also use their expertise by acquiring research grants since they know what types of research pursuits are possible and the how to acquire means to perform that research. They also know how to manage programs using existing campus courses and resources and they have the experience to run programs and produce results. In the academic environment, these faculty have control over their own research projects, which is not a typical scenario in industry. This managerial freedom, coupled with a strong sense of academic freedom, will lead to improved retention. There must also be a willingness on the part of the university administration to full-time faculty to apply for and receive research grants.

Full-time faculty members, that are also involved in professional and industrial consulting, bring the best of both worlds to the university. They provide a combination of academic theory and industrial practicality that can constantly evolve during the course of their various consulting pursuits. The disadvantage is that consulting can take the faculty off-campus and therefore limit their availability for the student. However, when the merits of professional development, industrial and government networking, and keeping abreast of the latest trends in one’s field, the advantages of consulting are undeniable, and worth the risk of limited availability. In order to improve retention, administrations must be willing to afford some flexibility in terms of free or release time for selected full-time faculty who have appropriate consulting opportunities.

Full time industrial employees bring technical currency to the university as adjunct faculty. They deal with the state of the art on a day-to-day basis. They know what the questions are and who might want to pay for those answers. They know how to prepare students for an industrial future, both technically and personally and their interaction with full-time faculty is critical in terms of keeping them up-to-date. In addition, the industrial employee adjunct can aid in the process of finding co-ops for current students and full-time employment for students upon graduation. Over the years, the full-time faculty can forge strong relationships with adjuncts which can improve retention of both, and have positive effects on the given ET program.

Another aspect of recruitment and retention of faculty is that of the type of contract offered to the new faculty member. Typically in today's employment environment, there is a "try before you buy" approach to hiring. Often, the contract is for temporary (one to two year) employment, which can be beneficial to both parties. The new faculty member can determine if academia is really the work environment they think it is, while the university community can determine if the new-hire seems to be appropriate for academic life, and if their credentials are appropriate. This is especially true for the case of new academic programs that may be based on the hiring of that faculty member. If the program works out, the university can offer the faculty member a tenure-track contract. If the program is found to not be viable, the university can halt the program and not renew the faculty member's contract. Unfortunately, these types of contracts may make it difficult to attract high quality faculty members due to the short nature of the appointment. However, most universities will recognize and reward demonstrated excellence on the part of new faculty.

II. Mechanical Engineering Technology - The Balance Between MET Courses and General University Courses

In order to make most technology programs viable, as well as any university major, courses from both within the major as well as from the greater university must compose the curriculum. Typically, there are a minimum number of dedicated courses for a given major that must be offered in order to give the major a sense of “identity”. These core courses are also critical in terms of ABET accreditation. As an example, the MET curriculum offered at Ward College is shown in Table 1. It can be seen that there are 10 required MET courses constituting 32 credit hours, along with 12 credits of technical courses which may either come from within the MET program, or from a select group of courses outside the major. Of the remaining 83 credits, courses from across the University are used such as computer aided drafting, chemistry, physics and various human/social science electives. From experience, the authors have found that a minimum of only one “full-time” faculty was needed, in addition to two adjuncts per semester, to cover the required course offerings. At Ward College, a faculty member is customarily required to teach 15 contact hours per semester which means that two lab courses (a three-hour lecture and a three-hour lab) as well as one three credit lecture course is required each semester. For the MET program, one full-time faculty teaching a full load, along with two lab courses covered by adjuncts, has been shown to adequately provide course coverage. This allows Ward College to offer up to five MET courses per semester. The current enrollment in the MET program at Ward is 35 majors, leading to an average class size of 11. These small class sizes are extremely attractive to both potential students and faculty, and are also economically viable because only one full time faculty member is supported by the program. It should be noted, however, that enrollment in the MET program has seen significant growth over the last two years (in 1997-98 there were only 24 majors), and it is likely that a second full-time faculty member will be added.

III. Servicing a Part Time Student Body From Industry

In order for technology programs to be successful, they must be able to offer a realistic evening program servicing part-time students whom often come from industry. Unfortunately, most colleges do not have the luxury of offering both evening and day sessions of the same course. To this end, Ward College has enacted the following policy: each faculty member is strongly encouraged to teach one lab course per semester in the evening. Usually, these courses are upper division, but lower division courses must also be covered. By creatively scheduling upper division core courses as well as technical specialties in the evening, on alternating semesters, most student needs can be addressed with the minimum number of faculty mentioned above. In the MET program, two upper division lab courses are offered in the evenings each semester. Typically, this involves a Monday-Wednesday, and a Tuesday-Thursday scheduling, which permits part-time students to take up to two lab courses (8 credits), per semester. In addition, the University attempts to offer general requirements such as physics, chemistry and various professional electives in the evening. This methodology has allowed the MET program to function in an extremely economical fashion, especially during its initial phase. As the program grows, the administration can safely add full-time faculty with the knowledge that the program is viable.

IV. Conclusion

Through the creative use of both adjunct and full time faculty, universities can economically support new programs without having to bear the cost of hiring a large full time faculty. In most cases, the administration must balance the role of full time faculty with that of part time adjuncts, who usually come from industry. Through this approach, ET schools can essentially have the best of both worlds in terms of keeping up to date with the latest trends in industry, while minimizing the large expense of full-time faculty members. However, it is critical attract and retain the highest quality full time professors, since they will form the nucleus of any given technology program. Finally, full time faculty retention can be improved by encouraging academic freedom and industrial connections.

Bibliography

1. Engineering and Technology Enrollments Fall 1997, Engineering Workforce Commission of the American Association of Engineering Societies, April, 1998.
2. Engineering and Technology Enrollments Fall 1995, Engineering Workforce Commission of the American Association of Engineering Societies, April, 1996.
3. Engineering and Technology Degrees 1998, Engineering Workforce Commission of the American Association of Engineering Societies, August, 1998.

SALLIE (LEE) TOWNSEND

Lee Townsend is currently the Associate Dean at Ward College. She is also the Director of the NASA sponsored, Connecticut Space Grant Consortium. Lee has employed many unique and innovative teaching methods in mathematics and physics courses including the use of multi-media and computer analysis packages. Her research interests include laser optics and advanced machining methods. Lee received her B.A. in Physics from Smith College, and her M.S. and Ph.D. in Physics from the University of New Hampshire.

HOWARD CANISTRARO

Howard Canistraro is currently the Assistant Dean for Research and Technology at Ward College. He is in charge of the Mechanical and Audio Engineering Technology programs, which have seen a yearly student growth rate of 20% over the last three years. He is also involved in research on advanced turbine materials for use in jet engines, and holds a patent on a new method of mammography which is under development. He received his B.S., M.S. and Ph.D. in Mechanical Engineering from the University of Connecticut and also worked for four years as an engineer at Pratt and Whitney Aircraft Inc.



University of Hartford
Ward College of Technology

MECHANICAL ENGINEERING TECHNOLOGY (B.S.) 1999-2000

The Bachelor of Science (BS) with a major in Mechanical Engineering Technology (MET) degree program will prepare students for careers in the manufacturing and mechanical design industries. The program focuses on manufacturing processes and material design, testing to industry standards, hands-on training in design and drafting using computer technology and balancing design objectives with production constraints. Graduates work as members of a manufacturing team assisting with planning and designing, analyzing the cost-effectiveness of production methods, drafting plans for proposed machines or parts, testing manufactured goods to ensure quality and supervising the work of skilled mechanical craftsmen.

Course Name	Credit Hours	Class Hours	Lab Hours	Contact Hours	Course Name	Credit Hours	Class Hours	Lab Hours	Contact Hours
SEMESTER 1					SEMESTER 2				
EN 111 English I: Expository Comm	3	3	0	3	MTH 122 Math for Technolog II	3	3	0	3
ET 111 Intro to Eng Technology	1	1	0	1	PG 111 Programming for Tech	3	3	0	3
MET 232 Manufacturing Processes	4	3	3	6	PHY 120 Algebra-Based Physics I	4	3	3	6
MTH 112 Math for Technolog I	3	3	0	3	Human/Soc Science Elective	3	3	0	3
All-University Curriculum	3	3	0	3	All-University Curriculum	3	3	0	3
SEMESTER TOTALS	14	13	3	16	SEMESTER TOTALS	16	15	3	18
SEMESTER 3					SEMESTER 4				
CH 110 College Chemistry I	4	3	3	6	EL 245 Elec/Electron Fund	4	3	3	6
ES 220 Graphic Communication	2	2	1	3	EN 241 English II: Tech Comm	3	3	0	3
MTH 232 Math for Tech III	3	3	0	3	ES 221 Advanced Graphic Comm Usin	3	3	0	3
PHY 121 Algebra-Based Physics II	4	3	3	6	MET 241 Material Science Lab	1	0	3	3
All-University Curriculum	3	3	0	3	MTH 241 Math for Technolog IV	3	3	0	3
					PHY 250 Materials Science	3	3	0	3
SEMESTER TOTALS	16	14	7	21	SEMESTER TOTALS	17	15	6	21
SEMESTER 5					SEMESTER 6				
EL 353 Industrial Instrumentation	4	3	3	6	MET 360 Mech of Mat for Eng Tech	4	3	3	6
MET 356 Statics for Eng Tech	3	3	0	3	MET 363 Machine Design	4	3	3	6
MTH 352 Math for Technolog V	3	3	0	3	MET 365 Fluid Mechanics I	4	3	3	6
Professional Elective	3	3	0	3	All-University Curriculum	3	3	0	3
Professional Elective	3	3	0	3					
SEMESTER TOTALS	16	15	3	18	SEMESTER TOTALS	15	12	9	21
SEMESTER 7					SEMESTER 8				
EN 481 Eng III: Adv Tech Com	3	3	0	3	MET 482 Senior Design Project	3	3	1	4
MET 470 Thermo I for Eng Tech	4	3	3	6	MET 484 Automation Systems	4	3	3	6
MET 475 Kinematics and Dynam	4	3	3	6	Technical Specialty	4	3	3	6
Professional Elective	3	3	0	3	Technical Specialty	4	3	3	6
Technical Specialty	4	3	3	6					
SEMESTER TOTALS	18	15	9	24	SEMESTER TOTALS	15	12	10	22
PROGRAM TOTALS	127	111	50	161					

Professional Electives are courses that contribute to a student's career goals and objectives, and are carefully chosen by the student in consultation with the academic advisor. They normally will be courses in engineering technology, engineering, science, mathematics, business, computer science, music, or education: courses from other areas may be taken if they contribute to a student's career goals and objectives, and if they are approved using a substitution/waiver form. Technical Specialties are specific upper level Ward College courses in the major. Acceptable Technical Specialties in this program are MET 364, 472, 473, 474, 481, 483. Students are encouraged to supplement their program of study by taking Unrestricted Electives from any of the colleges in the university. Graduation Honors are conferred only to students who have completed a minimum of 60 credits in residence. Students must complete their final 34 credits at the University of Hartford.

Table 1: MET curriculum example at Ward College.