UCC Program Review Committee summary of review

Program – Department of Engineering Technology and Management (formerly the Department of Industrial Technology)

This program includes the following degrees, minors, and certificates:

- B.S. in Engineering Technology and Management

Recommendation

This program is found to be viable, see the report for commendations, concerns, and recommendations.

Date of last review – AY 2008

Date of this review – Spring 2015

This review has been sent to program chair, he has commented on the review, his comments are attached at the end.

This review has been sent to program college dean. His comment is attached to this report at the end.
University Curriculum Committee
Academic Program Review

Engineering Technology and Management (ETM)
Dr. Peter Klein, Chair & Dr. Todd Myers, Assistant Chair
Ohio University – Russ College of Engineering and Technology
Dean Dennis Irwin

Documents used for internal Review Process
NAIT Self Study 2009 Report
2013 Seven Year Review-ETM
OU Career Further Education Study & ETM Faculty Vita

Internal Reviewers
Dr. Orianna Carter, Associate Professor, Biological Sciences
Dr. Judy Millesen, Associate Professor, Leadership and Public Affairs

Introduction & Process Overview
The Department of Engineering Technology and Management at Ohio University underwent an academic program review in April 2015. The Academic Program Review Committee was comprised of two internal members, Dr. Orianna Carter, Associate Professor, Biological Sciences, Ohio University Southern and Dr. Judith Millesen, Associate Professor, Voinovich School of Leadership and Public Affairs, Ohio University Athens.

The internal program review relied heavily on documents prepared as part of an accreditation process. These documents included: Seven-Year Review prepared for internal University purposes, A Self-study Report completed following guidelines presented in the National Association of Industrial Technology Accreditation (NAIT) Handbook, faculty vitas, and a seven-year employment study. The team also reviewed the department’s website to assure that the internal documents prepared as part of the accreditation process were still an accurate reflection of the department at the present time.

Ohio University’s Department of Engineering Technology and Management impressed us as a strong, viable program with a solid history of preparing students for full-time employment upon completion of their bachelor degrees. The majority of graduates are employed in the business sector as manufacturing engineers, project engineers, application or sales engineers, and production managers. Moreover, a majority of the alumni report satisfaction with their major courses and believe that Ohio University prepared them well for their current careers. Over a seven-year period (2004-2010) program bachelorettes reported annual salaries in the range of $39,520 to $53,182, with a mean salary of $45,568.

This report is divided into three key sections. The first section provides an overview of the program including general information about the department, a faculty profile, programmatic practices, research and productivity, and information about the major. The second section address major programmatic challenges. Specifically we mention the timing of the self-study report, address the difficulty assessing student outcomes, challenges related to attracting
diversity, and the lack of access to faculty survey information. The review concludes with commendations and specific recommendations.

PROGRAM REVIEW

The Engineering Technology and Management (ETM) was formally created in fall quarter, 2010 when the department, major and program names changed from Industrial Technology (IT). The program’s accrediting organization changed its name to the Association of Technology, Management and Applied Engineering (ATMAE) from the National Association of Industrial Technology (NAIT; for more information see www.atmae.org) in 2009.

Today the department offers a Bachelor of Science in Engineering Technology and Management (BSETM), combining technical courses with a business minor, which emphasizing quantitative sciences, natural sciences, and general education courses to prepare graduates for technical, management, and/or applied engineering positions in business and industry. Over 90% of the ETM courses include lab activities in which students apply the theory they learned in the classroom to “real life” problems with outcomes and consequences essential to experiential projects. The ETM graduate is a technical generalist, competent in assessment of problems and generation of solutions to improve productivity related to product specifications, materials and processes, industrial control and systems, and operations management.

The formal definition of the Bachelor of Science in Industrial Technology undergraduate program (as directed to students and prospective students) is as follows:

Industrial technology is the study of materials, production processes, and management procedures used in manufacturing. This degree program prepares you for a technical/management position in the manufacturing industry by providing current and relevant subject matter and experience. Typically, an industrial technology graduate is responsible for management and supervision of industrial computers, materials, machines, and personnel in areas of production, process planning, maintenance, and quality assurance. The industrial technology program prepares you to be a technical generalist: one who is competent in a wide range of technical subjects. In addition, since most industrial technology courses are hands-on lab courses, you graduate with practical experience. All students in the program complete a common core of industrial technology courses. In addition, you must take courses in one of two technical focus areas: Manufacturing Materials and Processes (MMP), or Manufacturing Information Technology (MIT), depending on your interests and career goals. The BSIT degree includes a minor in business. There are four components to the curriculum: technical, general education, business, and elective courses. Each component contributes a valuable part to your overall preparation for employment.

Faculty Profile
At present, there are a total of 13 faculty members; four at the rank of full professor (one in an emeritus capacity); four at the rank of associate professor (one emeritus, one retired); three assistant professors, one lecturer, and one technician.
Programmatic Practices

Teaching and Advising
A typical teaching load for the ETM department faculty is six courses per year on a 3/3 load. A course is defined as the lecture and lab/s scheduled for a course number. A course may include multiple lab sections with a combined lecture. This load may be reduced for various reasons including: administrative responsibilities (Chair and Assistant Chair), research activities (classes may be “bought out” by funded projects), and new faculty may have a reduced load for the first term. All ten faculty are academic advisors and the number of advisees is determined by dividing the number of majors by the number of full time faculty. All non-majors needing advising are directed to the Chair. Given the department offers only an undergraduate degree, teaching is a primary focus and workload is distributed as 70% teaching, 20% scholarly activity, and 10% service.

Research and Creative Activity
The ETM department is an undergraduate department with teaching as its primary focus. All faculty participate in professional organizations in which they present papers, author publications and many have held leadership positions. Over 50% of faculty authored textbooks and most have been involved in funded research projects.

Service
Many ETM faculty have contributed to the profession through service in leadership positions in national and international organizations. Additionally ETM faculty participate in numerous college and university committees as well as the Faculty Senate, representing 10.25% of the faculty performance assessment for this department. Three faculty members regularly teach Operations Management for the College of Business.

Interdisciplinary Work
Many ETM faculty are regularly involved with interdisciplinary work, primarily in the area of teaching, most specifically service courses for Mechanical Engineering, Industrial & Systems Engineering and Civil Engineering. In addition faculty are often requested to give “guest” lectures in engineering and business courses due to the areas of expertise and experience among the program’s faculty. Guest lectures include a lab demo or co-teaching an entire course within another department. Other interdisciplinary work has included providing support, where ETM faculty expertise and experience provided a valuable asset to a funded research project.

Diversity of Faculty/Students
The current demographic profile of faculty in the Department of Engineering Technology and Management consists of 11 tenure-line and 1 non-tenure track faculty; 11 of the 12 faculty members are male. One faculty member is from India and one male faculty member is of Hispanic descent.

As reflected in the rest of the university, the majority of undergraduate students are middle class white students. The majority of students in ETM are male (approximately 90%). The department worked with the College’s multi-cultural program to reach out to minority and
female students. Recruiting efforts in this area have included visibility at summer programs and other sponsored events.

**Research, Scholarship, & Creative Activity**

**Scholarship**
As an undergraduate teaching department, most of the work in RSCA has been in scholarship. This primarily includes writing, publishing and presenting scholarly papers, although some faculty have authored textbooks. About 50% of ETM faculty are regularly involved with externally funded projects which provides a small amount of income for the department.

**External Support**
External financial support for the Engineering Technology Management program comes from several sources, including endowment and donations through the Russ College of Engineering and Technology. One endowment fund provides support for two ETM faculty members (Kraft Family Scholar); the Myslenski Fund provides discretionary funds (the chair’s discretion), while the Stocker Endowment assists in purchase of supplies, travel and scholarship costs for faculty and student advancement. During 2005-2013, there have been 58 awards totaling 1.3 million USD to ETM faculty, primarily funded by government grants and industrial partners (90% of total funding provided approximately equally between the two), with the remaining 10% generated by international sources. Since 2008, external funding awards were generated by industrial and foreign partners only, with omission of state and federal funds concurrent with decline in funding for the department. A major source of funding for lab improvement is “House Bill” money, with ETM purchasing over $70,000 worth of new equipment between 2003-2008.

**Resources**

**Staffing**
The department has two support staff including a department administrator and a lab manager. In addition, student employees assist in the instruction and operation of the department during the academic year. Student workers fall into two categories, clerical help and lab support. The clerical workers assist with details of department operations. The lab workers provide material preparation, lab activity setup, and maintenance support under the direction of the Lab Manager.

Typically, each faculty member is assigned one or more student assistants; some funded through the department and others through University supported programs such as work-study and PACE. In the years between 2006 and 2009, ETM provided opportunities for 24 PACE students.

Computer support is provided through two Russ College supported computer specialists. They are responsible for the college computer labs, networks, and common office software. They service the labs and departmental offices with a staff of graduate assistants.

**Physical Facilities**
The department has eleven well-equipped laboratories that appropriately reflect the types of equipment encountered in the industrial environment, both old and new. While the department
strives to have the latest and greatest equipment, old equipment is not necessarily bad particularly since once students graduate, they are likely to work in a plant that has a mix of old and new equipment. In fact, a survey of program graduates, employers, and advisory board members found a level of agreement at the 84th percentile with regard to the degree to which equipment appropriately reflects contemporary industry (including CNC Machining & Turning Centers, programmable logic controllers, plastic molding equipment, laser scanners, metrology equipment, and a coordinate measuring machine).

The department shares ownership and usage of some equipment with several other departments. For example, the department is one of four who share access to and responsibility for the college-wide Computer Integrated Manufacturing lab. In another example, the department shares the use of a Programmable Logic Controller lab, which is under the jurisdiction of electrical engineering. This lab has been recently upgraded to reflect Logix5000 Rockwell Automation controllers that are interfaced via LAN and RS232 to personal computers for programming and monitoring.

The department relies on various internal and external sources to plan and implement laboratory and facility upgrades. Internal sources include RSCA awards including the 1804 Fund and the Russ College technology fee. External sources include House Bill money for the purchase of new equipment to support undergraduate laboratory instruction; industrial donations to purchase things such as bar code scanners, an injection molding machine, and fluid power trainers; and donations solicited by faculty and university development officers.

**Technology**

Students and faculty in the Department of Engineering Technology and Management have access to a variety of computing equipment. Each faculty member is provided with a PC and most faculty also have laptops at their disposal.

The College has five general-purpose computing labs, two of which are considered IT labs. The labs are equipped with 24 Intel Dual Core based computers, each with Ethernet network adapters, large hard drives and CD Rom drives. All computers have access to a networked laser printer. These Windows based computers are configured with the latest versions of Internet Explorer, Microsoft Office Suite (Word, Excel, Access, PowerPoint) in addition to MS Project, AutoCAD, Solid Edge, MATLAB, and MasterCAM. Specialty software used in specific courses is loaded as the need arises. Lab computers are on a three-year replacement cycle.

Students also have access to other specialized computing labs in the college and university. Two special computer labs are the MIT lab and the Auto ID lab, both with a variety of platforms, operating systems, and software. Survey results indicate a high degree of satisfaction with the adequacy and availability of computer systems.
Undergraduate Program Review

Curriculum
There are nineteen core requirement ETM courses, including a capstone and six elective ETM courses, which make up the technical core, including coursework in computer graphics and solid modeling, material science, production and operations, material processing, computer applications, visual basic programming, electronics, quality assurance, and instrumentation and control. Most courses in the technical core require extensive hands-on laboratory time in addition to the classroom lecture/theory time. A complement of required general education courses covers mathematics, physics, statistics, communications, psychology, chemistry and English. ETM students will also have completed a minor in business management with the requirement of six courses in business finance, marketing, accounting and business information systems and law and society.

There are no admissions requirements or testing into ETM beyond OU admissions (2.0 GPA) but there is an advanced program coursework requirement of ≥2.5 GPA in technical coursework. While few ETM students have credit transfers from outside of Ohio University, it is not unusual for Junior standing OU students to transfer into the program. The GPA of graduates of the ETM program at Ohio University is consistently higher than campus average, for example cumulative 3.084 vs. 2.656 respectively (as calculated in year 2008).

Students
For the period between Fall 2005 and Fall 2011 the headcount for undergraduate ETM majors ranged from a low of 132 (2005) to a high of 171 (2009); averaging <5% females and ≅10% of non-Caucasian demographic. The ETM program Year-One retention rate is in the 90th percentile. Overall, freshman students entering the Russ College of Engineering and Technology have ACT scores of 24.0 (SAT Math 598/Verbal 551). As anticipated, ETM graduates, like all of Russ undergraduates, maintain higher GPAs that campus average, 3.282 and 2.750 respectively (NAIT 2009 Accreditation Report). New enrollments have remained stable, and the 43.8 average graduating seniors reflects that a many students enter ETM as transfer students from other programs, often as late as their Junior year. The ETM program has a policy of mandatory completion in the lower level ETM courses and one each of communication, quantitative, physical science, and business courses (accumulative GPA of 2.5) prior to being admitted to advanced standing.

Students Taught in Service to Other Departments.
The ETM Department has been well accepted in the University community. The ETM Faculty have an excellent rapport with the College of Business and they have accepted an ETM course as a substitute for a required business class OPN 300 Operations Management, for students seeking a business minor. In addition, three ETM Professors have taught courses for the Business College at the undergraduate and graduate levels.

Assessment
The ETM assessment plan uses both qualitative and quantitative methods for program assessment by literature review and surveys. Learning Outcomes/Competencies for currency and relevancy outcomes were based on the Society of Manufacturing Engineers competencies. Surveys and interviews are conducted during the period of the self-study evaluation time and
included employers, alumni, students, industrial advisory board members, and faculty. Assessment methods were performed through analysis of data collected, feedback and modifications procedures. Furthermore, faculty members are expected to annually review their course learning outcomes/competencies and validate how they support the program outcomes/competencies. This regiment is followed with a bi-annual departmental review to determine what, if any, modifications are needed at the program and course level in order to support the program goals. To further validate the efficacy of the program, a portion of the ETM student population participates in the Society of Manufacturing Engineers “Certified Manufacturing Engineering” exam as well as the NAIT’s “Certified Manufacturing Specialist” exam. ETM administration reviews the results of these student exams to ascertain student mastery indicators for the stated learning outcomes and competencies.

Job Placement
Based on ETM’s annual follow-up survey, graduates find employment in large international companies as well as small local companies. Commonly reported job titles from alumni include Manufacturing Engineer, Project Engineer, Quality Engineer, Application/Sales Engineer, and Operations Manager. Due to the business focus of the major many graduates advance in their careers to senior positions in organizational management. Parker Hannifin has been hiring ETM graduates for many decades and alumni have achieved positions as high in the organization as Vice President. A tier one supplier to Honda, TS Tech, has also employed many ETM graduates, as well as another employer, CVG (Commercial Vehicle Group). Average starting salary reported by 2007-2008 graduates was $48,000.

Post-Baccalaureate Studies
The department has no graduate program and has no formal tracking procedure for those students who pursue graduate study elsewhere. For those graduates who choose to pursue an MBA degree, the minor in business, included in the BSETM, typically fulfills the prerequisite course structure for the MBA.

Self Study
Validation of the major program outcomes and student competencies are performed using an ongoing process accomplished through a combination of external experts, an industrial advisory committee(s) and follow-up studies of program graduates. Documentation of this validation is provided in the Seven Year Self-Study Report. Basically, a self study survey instrument is performed using NAIT accreditation standards as completed by the fourteen individuals comprising the Department of Industrial Technology - Industrial Advisory Board (10 members are OU ETM alumni, pre-2002), recent graduates of ETM (for example, between 2002-2008, 57 students or 16% of total graduates in that period) and employers (17 of 41 responded in 2009). The entire process seeks to gather review of pertinent literature including reports and web-site investigations, faculty opinions, administrative review and anecdotal reports from faculty members who have served on NAIT accreditation site-visit teams and the NAIT Board of Accreditation and various program review teams at Ohio University and throughout the nation.

Students participating in annual follow-up surveys are asked specifically to list the most relevant ETM courses and the most relevant non-ETM courses they took. This feedback is reported to the faculty and is carefully considered in program revisions.
PROGRAMMATIC CHALLENGES

The Review Team noticed three items in the self-study worth mentioning: 1) Student and Faculty Diversity; 2) Timing of Major Declaration; and 3) Outcomes Assessment.

Enrollment Diversity and Faculty Diversity
Recruiting a diverse student body is a challenge across Schools, Colleges, Departments, and Programs at Ohio University. Nonetheless, considerable effort is invested in attracting and retaining a demographically diverse community of faculty, students, and staff. In terms of gender and race/ethnicity, ETM is not particularly diverse; however, it appears that in terms of professional expertise and specialized practical experience, the department employs sufficient staff with differing skill sets to meet the educational expectations of students and employers. It may be useful to report and promote departmental diversity in ways that expand familiar conceptions of diversity beyond race, gender, and ethnicity.

Timing of Major Declaration
While the ETM program is well received according to student respondents, it is curious that so many Junior standing students switched into this major late in their school years; suggesting (1) they were unaware of it previously, or (2) they were dissatisfied or concerned with potential outcomes of another program they had been enrolled in. In either event, the ETM program appears to be a successful, applied science degree through Russ College. With its high placement rate in the region, ETM appears to be a good career choice for the local Appalachian population. It is unclear whether its approachability is realized to the enrolling student population, specifically at OU regional campuses.

Outcomes Assessment
University mandates resulting from the university’s implementation of the Academic Quality Improvement Program (AQIP) require the department to develop viable assessment practices for its programs. The AQIP is one of the Higher Learning Commission's pathways to accreditation. HLC developed AQIP to help institutions like Ohio University retain institutional autonomy and academic freedom by providing a structure to demonstrate what it does to achieve academic excellence. Of specific relevance to the ETM is criterion four which requires that all academic programs assess their student learning objectives. Each academic program has been asked to update student learning objectives; identify sources of systematic evidence (qualitative and/or quantitative); and develop an action plan to improve teaching and learning based on the evidence gathered.

Quality program assessment is essential if faculty and administrators are to assemble useful data that can inform decision-making about student learning and development, professional effectiveness, course changes, program quality, and future direction. Needless to say, any assessment plan should be aligned with department’s sense of mission and strategic goals. Moreover, assessments should involve input from as many of the current faculty as possible as well as student feedback. Given the fact that data are collected for an external accreditation body, collecting and synthesizing outcome data can be part of the overall data
analysis required for accreditation. It will be important for the department to use what it learns to improve student learning.

RECOMMENDATIONS

The Review Team offers three recommendations in the areas of student recruitment, curricular enhancement, and faculty diversity.

Student Recruitment
The ETM program may want to consider improving regional campus outreach in an effort to draw in students in their first two years, perhaps identifying preparation coursework for pre-ETM students, which can be coordinated at the regional campus level with assessments tied to performance. This strategy would also serve OUS mission of drawing in students from divergent backgrounds and likely across the sexes.

If the department were interested in recruiting a diverse student body and students early in their academic careers, it may be worth updating the website to include more information about faculty, their areas of expertise, and the ways in which each faculty member engages students in applied learning experiences outside the university.

Curricular Enhancements
The curriculum for ETM does not specifically require biological principles regarding ecological or sustainability impacts, nutrient and energetics cycling in the industrial environment. Current ETM student surveys reported that the lowest ratings were achieved when asking students if science was adequately covered in their coursework (only 55% said yes). As such, the lack of a requirement for ecological ethics in industrial management appears significant.

Biology and/or environmental sustainability coursework should be required at the lower level for ETM majors to assess impacts of responsible industry and manufacturing on land, air and water.

Faculty Diversity
The department has made a commitment to work with College’s multi-cultural program to reach out to minority and female students at summer programs and other sponsored events. There are also a number of University resources available to departments to assist in recruiting a diverse faculty. Perhaps reaching out to some of these resources might be useful the next time ETM is in a position to hire faculty.

We find the undergraduate programs in Engineering Technology Management to be viable.
September 2, 2015

Engineering Technology and Management Response to the University Curriculum Committee’s 2013 Academic Program Review.

Documents used for internal Review Process
NAIT Self Study 2009 Report
2013 Seven Year Review-ETM

Internal Reviewers
Dr. Orianna Carter, Associate Professor, Biological Sciences
Dr. Judy Millesen, Associate Professor, Leadership and Public Affairs

Dr. Ingram,

I have reviewed the report from the 2013 Academic Program Review (7 year review) of the ETM program which was received on August 3, 2015. I consider this report to be mostly accurate but due to the time lag of the report and the 2009 NAIT self-study the report was based on some factual items that need updated:

- Salaries of newly hired ETM graduates have increased each year. Over the 2010-2014 AY the ETM program has seen the salaries of newly hired graduates range from $40,000 - $78,000 with an average salary of $56,000 in AY 13-14. Some new hires are now receiving signing bonuses ranging from $2,000 to $13,000. Job placement continues to be good and commonly reported jobs titles from alumni continue to include Manufacturing Engineer, Project Engineer, Quality Engineer, Application/Sales Engineer, and Operations Management.

- In the last two years the ETM faculty has changed significantly due to retirements. The current demographic profile of faculty in the Department of Engineering Technology and Management consists of the following faculty: 5 tenure track, 3 tenured, one full time group II, and 4 early retirees; One tenure track faculty member is female, one faculty member is from India, one faculty member is from China, and one male faculty member is of Hispanic descent.

- Fall enrollments have been increasing over the last several academic years increasing from AY 12-13 =179 to AY 14-15 =188 and fall 2015 is expected to be ~215.

I also ask that the line in the report on page eight which states "In either event, the ETM program appears to be a successful, applied science degree through Russ College offering a modest, though respectable potential for income" be revised. With an average starting salary of $56,000 AY 13-14 (and appears to be higher last AY) I do not think that “modest” is the correct word.
I also would like to add that the ETM program just completed a re-accreditation visit from ATMAE in 2014 consisting of a full self-report and site visit and has received full re-accreditation.

On behalf of the Engineering Technology and Management Department I thank the committee for its work and recognition of the contributions of the ETM program to its students, alumni, and university.

Sincerely,

Todd D. Myers  Ph.D., M.B.A., C.S.T.M.
Dept. Chair
Professor

Cc: Dennis Irwin Ph.D., P.E., Dean, Russ College of Engineering and Technology
     Jeff Giesey, Ph.D., Associate Dean for Academics, Russ College of Engineering and Technology
David,

We would like to thank the UCC Program Review Committee for a thorough review of our Engineering Technology and Management Program and we concur with your determination of the viability of the program.

The program has a long history of performing outcome assessments from a variety of constituents and using the results to improve student preparation for careers in the field. Their success in this is reflected in this positive review and will continue to help maintain the high quality of the program on into the future.

Dr. Jeff Giesey
Associate Dean for Academics
Stocker Center 233
1 Ohio University
Athens OH 45701-2979
T: 740.593.1573
F: 740.597.4960
giesey@ohio.edu

www.ohio.edu/engineering
www.facebook.com/ohio.engineering
www.twitter.com/russcollege