GRADUATE PROGRAM REVIEW

of the

MASTER OF ENGINEERING PROGRAM

Whitaker College of Engineering

Texas Tech University

Committee Members

Dr. Ernst Kiesling, Chair
Whitaker College of Engineering

Dr. Cindy Akers
College of Agricultural Sciences and Natural Resources

Dr. Sukant Misra
College of Agricultural Sciences and Natural Resources

April 2012
Executive Summary

A committee comprised of three Texas Tech University faculty members and one faculty from the University of Wisconsin performed a review of the Master of Engineering (MEN) program in the Whitaker College of Engineering (WCoE) at Texas Tech University. The Graduate School’s Program Review Guidelines state the main objective of the review “to provide a mechanism for maintaining or improving the quality of graduate programs”. This report is the committee’s contribution to fulfilling that objective.

Committee members internal to Texas Tech included Dr. Ernst Kiesling, Whitaker College of Engineering, and Dr. Cindy Akers and Dr. Sukant Misra, both from the College of Agricultural Sciences and Natural Resources. Dr. Harold J. Steudel of the University of Wisconsin—Madison served as an external reviewer.

The Committee considered statistical information in a written report provided by the Graduate School; toured three classrooms that are equipped with distance capabilities from which MEN distance courses are taught; and interviewed key personnel associated with the MEN program. Those interviewed include:

- Dr. John Kobza, Senior Associate Dean of Engineering and considered Chairperson of MEN
- Brent Guinn, Director of Distance Education in the WCoE
- Dr Ming Chyu, Professor of Mechanical Engineering and Coordinator of MEN's Healthcare Option
- George G. Morales, P.E., BSME, MBA, a student in the MEN Health Care Option
- Dr. Al Sacco, Jr., Dean of the WCoE.

A synopsis of findings and recommendations is presented in this report.

Key Program Elements

The MEN serves directly the Strategic Priorities of the Texas Tech Strategic Plan\(^1\), especially

- Priority I—Increase Enrollment and Promote Student Success, and
- Priority IV—Further Outreach and Engagement.

\(^1\text{Leading the Way: 2020 Strategic Priorities and Goals}\)

The MEN program is designed to meet the needs of:

1. On-campus students in MEN programs,
2. Distance students,
3. Health Care Option Students,
4. Dual J.D / MEN students,
5. Dual degree students with the Jade Hochschule University in Germany.
The WCoE Distance Education Program, closely tied to the MEN, provides distance education services to off-campus students and to departments at Texas Tech desiring such services. At least one academic department – Industrial Engineering – has made extensive use of the distance program and significantly increased enrollments at the graduate level.

Most courses offered by the MEN are regular courses taught on campus by Texas Tech faculty who offer courses by extension also. The courses are of high quality, usually taught by Texas Tech faculty. This is considered a major strength of the MEN program. The major hurdle to progress and expansion is the fact that no department and no faculty member has this program as its primary responsibility. Hence the program lacks advocacy and focused leadership.

Although limited in numbers of MEN students, the mechanics of conducting 40-50 distance education graduate courses per year is performed well. Many of these courses are available to MEN students. Over the past six years (2005-2011) the MEN program has averaged about 17 enrolled students and 11 graduates per year.

Benefits and Values

- The MEN provides a multidisciplinary engineering degree or an engineering degree with a specialized focus. The potential for growth is good.

- Supported by a competent and experienced Distance Learning Program, the MEN serves as a way to test the potential and drive the use of distance education in Engineering.

- MEN serves as an in incubator for new programs of an interdisciplinary nature, with opportunities for WCoE to continue to institute new programs and to lead in interfacing with other colleges in forming alliances.

- It uses existing courses and faculty from departments in WCoE and other Colleges that are already in place, which allows the WCoE to increase graduate enrollments without significant increases in faculty or facilities. Expansion potential is vast in fields such as wind, water, energy, and some fields of engineering. Faculty initiatives and focused efforts are prime movers in such expansion.

- It offers great flexibility to students for an interdisciplinary engineering degree that best meets their professional needs.

- It offers great opportunity and flexibility for off-campus (distance) students to obtain a Master’s Degree in Engineering while being employed or deployed abroad.
Program Overview and Vision (Good)

Per the Graduate Program Review document provided by the coordinators of the Master of Engineering (MEN) program, the MEN degree is currently being used to meet needs of on-campus as well as distance students. The program is designed to provide an interdisciplinary degree to individuals who have undergraduate engineering or science degrees, and who seek to enhance their education in engineering at the graduate level. Students with undergraduate degrees in non-engineering or science-related fields, willing to level, also have the opportunity to work toward the MEN degree.

In addition to this generalized interdisciplinary option, the MEN program offers specialty options in Healthcare and J.D./MEN. The Healthcare option under MEN degree is designed to meet the growing demand for engineers trained to apply the principles of engineering, health sciences, and business administration to managing the physical, technological, and support services of healthcare facilities. The Dual J.D./MEN program is designed for students interested in the areas of intellectual property in law and science.

The MEN has available the entire educational curriculum and faculty resources of the College of Engineering (COE) and sometimes other colleges in the university, but it lacks the advocacy and focused leadership critical to achieving its potential. The enrollments and degree production are only a fraction of the program’s potential.

On-campus students enrolled in the generalized interdisciplinary MEN degree have access to all available courses in WCOE. Distance students are limited to offerings available at a distance. Healthcare and J.D./MEN options have defined curricula and thus are limited to the courses specifically recommended for those programs.

An on-site industry program in Dallas, TX sponsored by Raytheon served a significant number of graduate students in focused instruction and research. Conduct of the program required faculty travel to Dallas as well as some Dallas/Lubbock student travel. The program was discontinued in 2010.

A major barrier to expansion and growth is the lack of faculty, staff, or courses dedicated specifically to the MEN program. The Dean of the College of Engineering hopes to have an enrollment of 100 students in the MEN program. In our opinion, this is an achievable goal. To accomplish this goal, a comprehensive strategic plan for the MEN program should be developed, clearly articulating the mission and vision, goals, objectives, strategies, and measurable benchmarks. The strategic plan should consider the following suggestions:

1. Development of new tracks such as engineering-related career paths in wind energy and petroleum, in addition to the existing Healthcare and J.D./MEN should be explored.
2. Development of an effective marketing/communication plan to aggressively recruit on-campus as well as distance students should be considered. The information about the MEN program on the WCoE website can be further enhanced to include, for example, highlights of the Dual J.D/MEN program.
3. The possibility of appointing a Program Coordinator for each track should be explored. Dr. Chyu’s passion and focused efforts for the Healthcare track are major contributing factors for its success, but Dr. Chyu feels overloaded with his activities including full-time teaching and research in Mechanical Engineering. Designation of selected faculty to provide focused leadership to the MEN program and to each program area should be a priority.

4. Incentives and dedicated financial resources for program administration such as release time for program coordinators, technology advances, and marketing/communication/recruitment efforts should be considered.

5. There is reluctance on the part of some faculty to spend additional time required to organize and present a course via distance. To overcome this, it is advised that discussions be held involving the dean, department chairs, and interested faculty concerning the benefits to students and to the University. Adding a distance component to undersubscribed graduate courses represents an especially fertile endeavor. Faculty incentives and rewards for presenting courses by distance must be included in the discussion. Only modest resources allocation would be required to assist faculty in preparing courses for effective distance presentation. Course fees and their allocation should be discussed and encouragement given to interdisciplinary faculty teaming.

6. Explore opportunities for industry partnerships utilizing distance learning and MEN curriculum flexibilities. Raytheon-type programs can seemingly be conducted effectively and efficiently with little regard to geography.

Curriculum and Programs of Study (Very Good)

Master of Engineering Degree (General Option)

The MEN degree is offered on the campus of TTU and at a distance, and is a highly interdisciplinary, non-thesis program, designed primarily for practicing engineers. The curriculum consists of 36 semester credit hours, but does not require specific major or minor subjects. Up to 15 hours of credit for graduate course work completed in residence at another accredited graduate school is allowed, no more than 15 credit hours can be taken from any one engineering field, and students are allowed to take engineering courses from any of the college’s disciplines. Also, up to 6 credit hours of graduate-level course work may be taken outside of engineering. The curriculum and program of study for the MEN-General Option appear to be rigorous and adequate for the scope of the program.

Healthcare Engineering Option in the Master of Engineering Degree

The MEN Healthcare Engineering Option is relatively more structured than the General Option discussed above. The degree program is designed specifically for training students with bachelor’s degrees from various disciplines of Engineering to effectively manage the physical, technological, and support services of healthcare facilities. The healthcare engineering option curriculum consists of 36 graduate-level semester credit hours with 33 course credits (11 courses) and 3 credits for research. Credits may be accepted for as many as 12 hours for graduate courses completed.
in residence at another accredited graduate school. The 33 course credit (11 courses) requirement includes 27 hours (9 courses) of required courses and 6 hours (2 courses) of electives in Engineering, Health Sciences, and Business. The 9 required courses include 6 from Engineering and 3 in Health Sciences. The 2 elective courses can be selected from all the graduate-level Engineering and Health Sciences courses listed for the 9 required courses, or from a list of options in the departments of Biological Informatics, Biological Sciences, Information Systems and Quantitative Sciences, Management, or Public Administration. The curriculum and program of study for the MEN-Healthcare Engineering Option appear to be rigorous and adequate for the scope of the program.

Dual J.D. / Master of Engineering Program

The Dual J.D/MEN program is an option designed for students interested in the areas of intellectual property (copyrights, patents) and law and science. This option is a joint program by the TTU College of Engineering and the TTU School of Law that provides a student with dual JD and MEN degrees. The Dual J.D/MEN curriculum consists of a 3 year program requiring 126 graduate-level semester credit hours; 90 credit hours required for the JD degree, and 36 credit hours required for the MEN degree. Courses taken to meet the requirements of the MEN degree are taken by students in years 2 and 3 of the dual degree program. The School of Law awards 12 hours of credit toward the J. D. degree for completion of certain MEN degree courses. Likewise the College of Engineering awards 12 hours of credit toward the MEN degree for completion of the 3 hour J. D. degree courses. The curriculum and program of study for the Dual J.D/MEN Option appear to be rigorous and adequate for the scope of the program. However, the members of the Review Committee did not receive input from faculty of the School of Law or currently enrolled students to adequately gauge how the program is being perceived by them.

Faculty Productivity ( N/A)

Because the MEN program is administered at the college level there is no department or faculty whose primary responsibilities are tied directly to this program. Hence this portion of the review is not applicable to this report.

Quantity and Quality of Graduate Students and Graduates (Good)

Quantity

The MEN program is designed to meet the needs of on-campus students, distance students, Health Care Option Students, and dual J.D / MEN students. Over the last six years (2005-2011) the program has averaged about 17 enrolled students and 11 graduates per year, the distribution being shown in Appendix B. The enrollment for Spring 2012 shows 22 students, with 11 distance students, 9 Health Care Option students, 1 dual J.D / MEN student, and 1 dual degree (Germany)
student. Graduate programs need to continually monitor enrollment. The Texas High Education Coordinating Board (THECB) requires a program award 5 degrees a year. The THECB measures this by requiring a master’s program to award 25 degrees in a 5-year period. With Current numbers MEN is not in jeopardy. However; it is important to continue watching these numbers.

Quality

The graduate students appear to be highly-motivated and capable. Their academic records are generally good. We met with one on-campus health care option student. It was evident that he has a good morale, a sincere commitment to the mission and vision of the College of Engineering, and effective academic skills. This student also expressed how beneficial this degree was to his current employment. The committee and the college would have liked to meet with some current distance students but no online student attended the scheduled meeting.

The committee was required to make much of the student quality judgment based on the self-study. The committee looked at job placement to help determine the quality of the students. It is reported in the document that most of the MEN graduates find appropriate jobs in a wide array of settings. Many of the jobs were advancements within their current career. This program appears to be meeting the needs of the industry allowing mid career professionals the opportunity to advance in their career.

Facilities and Resources (Good)

Although the MEN program does not require distance instruction, its growth and realization of potential can be abetted by expanding the number of distance courses. Availability of rooms equipped with facilities for distance education is limited and presents some scheduling challenges since distance courses are usually coupled with on-campus courses. Few choices exist for a faculty member to simply offer by distance a graduate course already scheduled on campus. Two large modern classrooms are equipped to offer distance education but these large classrooms are a high priority for regular large classes throughout the day. Including distance capabilities in classrooms in new or renovated buildings is recommended to increase the number of classrooms available for teaching both on campus and distance students. The plans of having distance education capabilities in a building renovated for petroleum engineering is a step in the right direction for the MEM program as well as for the Petroleum Engineering Department.