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March 7, 2002

MEMORANDUM

To: Mr. Dalton B. Floyd, Jr., Chairman, and Members, Commission on Higher Education

From: Ms. Dianne Chinnes, Chairman, Committee on Academic Affairs and Licensing

Consideration of Initial License Request

Lehigh University, Bethlehem, PA
M.Eng. in Chemical Engineering and M.Eng. in Polymer Science and Engineering;
M.S. in Polymer Science and Engineering; Quality Engineering; Chemistry;
Molecular Biology; and Pharmaceutical Chemistry

Summary

Lehigh University requests approval of an initial license to offer programs leading to the Master of Engineering in Chemical Engineering, Master of Engineering in Polymer Science and Engineering, Master of Science in Polymer Science and Engineering, Master of Science in Quality Engineering, Master of Science in Chemistry, Master of Science in Molecular Biology, and Master of Science in Pharmaceutical Chemistry.

Lehigh University is a non-profit, private, co-educational institution and is accredited by the Middle States Association of Schools and Colleges. It was founded in 1865 and began awarding graduate degrees in 1882. The University has ten years of experience in offering master's degrees by distance education. It offers the programs under the distance education guidelines of the Commonwealth of Pennsylvania. Its engineering curricula are accredited by the Accreditation Board for Engineering and Technology. Programs in chemistry are approved by the American Chemical Society.

Lehigh and Trident Technical College (TTC) have signed an agreement under which Trident will serve as a downlink receive site for Lehigh programs transmitted by satellite. The programs will be made available to technical and managerial personnel in

the Charleston area. To enable working professionals to pursue graduate education, the Lehigh Educational Satellite Network (LESN) carries live on-campus classes broadcast by satellite to off-campus sites currently in eight states. All but the programs at TTC are offered at corporate sites. Using one of the high-tech, multimedia classrooms at TTC provides extensive opportunity for interaction with instructors and classmates. With this emphasis on interactivity, students are expected to view the courses live (videotape back-up is available for those who need to miss class occasionally), interact with the instructors, and complete assignments on time. As a result, when completing a credit program, distance students receive the same Lehigh degree as on-campus students taught by regular on-campus Lehigh faculty. Tuition is \$610 per credit hour.

Lehigh anticipates enrollment of 11 students during the first academic year, 18 students during the second academic year, and 27 students during the third academic year. The projected enrollments are not an issue for Lehigh because the courses are offered in real-time and at nominal costs to Lehigh and Trident.

In addition to local libraries, off-campus students have access to a variety of resources for research and reference. The Virtual Library of Lehigh provides a full range of electronic indexes and abstracts, reference works, and full-text databases such as Infotrac, ABIInform, and Lexis/Nexis Universe. Tables of contents for over 17,000 multidisciplinary journals are provided by UnCover. The database is updated daily. Students may search by author and keyword and view tables of contents for journals of interest. Free delivery (usually within 24 hours) of articles by fax machine is available for journals not held by Lehigh University Libraries.

Engineering Programs

❖ Chemical Engineering

The Master's Degree in Chemical Engineering program is a non-thesis program. For students holding a Bachelor's degree in Chemical Engineering, the program will include: not less than 30 semester hours of graduate work; not less than 24 hours of 300- and 400- level coursework, of which at least 18 hours are at the 400-level; not less than 18 hours in the field of Chemical Engineering; not less than 15 hours of 400-level coursework in the field of Chemical Engineering. In addition, up to six hours of coursework from the College of Business and Economics may be used.

For students not holding a Bachelor's degree in Chemical Engineering, the program will include: satisfactory completion of the Bridging Sequence (ChE 281-282-283) with a GPA of at least 3.3 (B+ average); not less than 30 semester hours of graduate work; not less than 24 hours of 300- and 400-level coursework, of which at least 18 hours are at the 400- level; not less than 18 hours in the field of Chemical Engineering; not less than 15 hours of 400-level coursework in the field of Chemical Engineering; and

completion of at least four of 8 of the core course and expanded core course offerings, at least two of which must be at the 400-level. In addition, up to six hours of coursework from the College of Business and Economics may be used.

❖ Polymer Science and Engineering

The Center for Polymer Science and Engineering (CPSE) is an interdisciplinary research-oriented center with faculty representatives from the participating Departments of Chemical Engineering, Chemistry, Materials Science and Engineering, Mechanical Engineering and Mechanics, and Physics. It includes the Emulsion Polymers Institute, the Polymer Interfaces Center, and faculty from the Engineering Polymers Laboratory of the Materials Research Center. The CPSE also is affiliated with the Zettlemoyer Center for Surface Studies. The CPSE offers graduate studies through the participating departments leading to the degrees of Master of Science and Master of Engineering (as well as Doctor of Philosophy) in Polymer Science and Engineering.

There are two options for a master's degree in Polymer Science and Engineering through LESN, both requiring a proficiency in polymers:

Master of Science Degree in Polymer Science and Engineering requires a total of 24 credits in course work and six credits in research based on a pre-approved library problem. The research report is directed and signed by a faculty member of the Center for Polymer Science and Engineering and co-signed by the chairman of the Polymer Education Committee or the director of the CPSE.

Master of Engineering Degree in Polymer Science and Engineering requires a total of 30 credits of course work. This option is intended for those students who do not work in a laboratory setting, or for whom thesis research is inconvenient, but who wish to obtain an advanced education in polymer science and engineering.

The Master of Engineering and the Master of Science require a similar coursework structure. Courses and areas of research emphasize polymer synthesis and characterization, physical polymer science, organic polymer science, engineering behavior, rheology, polymer blends and composites, polymer processing, emulsion polymers, polymer interfaces, and colloid science. Both degree options require 30 credits for completion and must include not less than 18 hours of 400-level coursework; not less than 18 credits of coursework in the major, of which 15 credits must be at the 400 level. However, instead of six hours of thesis research, the M. Eng. student would take six hours of additional coursework that must include two additional polymer courses at the 300- or 400-level. However, the student may substitute one 300- or 400-level non-polymer elective course in the home department if the major university requirements for the degree have already been met.

❖ Quality Engineering

American industry is competing in a world economy that rewards those who produce the best products at the lowest cost. Industries need employees who know how to improve product quality and to lower the costs of production. To solve problems of quality and cost, an engineer needs a special set of problem-solving tools and skills. The Lehigh University Master of Science in Quality Engineering program is an opportunity for working engineers to acquire these tools and skills in addition to the techniques needed for continuous improvement. The program is intended for industrial personnel who are in technical and/or management positions, and who are responsible for activities related to quality in their respective organizations.

Through this program, qualified students can earn a Master's of Science degree in Quality Engineering without writing a thesis or taking a comprehensive examination. Applicants should have a Bachelor of Science degree in any branch of engineering or science, although other educational backgrounds will be considered. Candidates with industrial work experience are preferred.

The satisfactory completion of ten appropriate courses (30 credit hours) satisfies all requirements for the degree. Five of the ten courses are core courses, required of all students, and five are elective courses. Three of the elective courses are selected from a list of courses approved by the faculty. The last two electives can be any graduate courses that the faculty coordinator approves. Students may petition to transfer credits (a maximum of six credits) from other institutions.

Science Programs

❖ Chemistry

Two Master's degree program options in chemistry are available. One is a 30-credit program and includes three or six hours of experimental research. The other is a 33-credit program and includes a three-credit literature review paper. The seminar requirement may add a credit to these programs depending on the courses selected. The analytical and organic concentrations are designed as 30-credit programs, while the bioorganic concentration is designed as a 33-credit program.

The Master's Degree in Chemistry must include: not less than 30 credit hours of graduate work; not less than 18 credits of 400-level coursework (research counts as part of the 400-level requirement); not less than 18 credits of coursework in the major of which 15 credits must be at the 400 level. Chemistry 481 (Seminar-one credit) must be included in the total credits. Proficiency at the advanced undergraduate level in two areas

must be demonstrated by examination or by passing the appropriate course with a grade of B- or better.

❖ Molecular Biology

The Master's Degree in Molecular Biology includes: 30 credit hours of graduate work; not less than 18 credits of 400-level courses (six credit hours of research counts as part of the 400-level requirement) and not less than 18 credits of coursework in the major of which 15 credits must be at the 400 level. The remaining credits are completed from electives. Students must register for six credits of research and successfully complete a research project under the direction of a faculty member of the Department of Biological Sciences and in collaboration with a staff research advisor at their site.

With the approval of the Department Graduate Committee and the Lehigh University Registrar, a maximum of six credits may be transferred in toward completion of the master's degree. A course grade of B or better is required for transfer credits.

❖ Pharmaceutical Chemistry

This interdisciplinary degree from the departments of Chemistry and Biological Sciences offers specialization in medicinal chemistry, drug development, diagnostic technologies, pharmaceutical spectroscopy, analytical methodologies, process chemistry, metabolism mechanisms, and molecular biological approaches to selected topics in pharmaceutical chemistry.

The Master's Degree in Pharmaceutical Chemistry includes 24 credits of course work and completion of a six-credit research project resulting in a thesis. Selection of courses must include no less than 18 credits of 400-level coursework (research counts as part of the 400-level requirement); not less than 18 credits of coursework in the major of which 15 credits must be at the 400 level. A 33 credit literature (library) thesis option may be available for some students not wishing to do experimental research. This option may be pursued only after approval by the program academic advisor.

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Recommendation

The Committee recommends that the Commission approve initial licensure for five years of Lehigh University to offer the programs leading to the M.Engr. in Chemical Engineering, M.Engr. in Polymer Science and Engineering, M.S., in Polymer Science and Engineering, M.S., in Quality Engineering; M.S., in Chemistry; M.S., in Molecular Biology; and M.S. in Pharmaceutical Chemistry by satellite at Trident Technical College, Charleston.

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