Lehigh University
Dean, P.C. Rossin College of Engineering & Applied Science
Position Profile

Lehigh University (hereafter referred to as Lehigh) has recently announced the appointment of John D. Simon as its 14th President. The appointment of President Simon, an internationally renowned chemist and widely respected leader in higher education, has generated palpable excitement and optimism among Lehigh faculty, students, alumni and staff. Prior to his ascendancy to the presidency of Lehigh, President Simon was the Executive Vice President and Provost at the University of Virginia. Before being recruited to UVA, Dr. Simon was the Vice Provost of Academic Affairs at Duke University.

Lehigh President Simon and Provost Patrick V. Farrell have appointed a Search Advisory Committee to identify and review candidates for the position of Dean of the P.C. Rossin College of Engineering and Applied Science (hereafter referred to as RCEAS). With great excitement, they now invite inquiries, applications and nominations for this senior leadership position.

**Lehigh Engineering**

Lehigh is a premier research university that uniquely combines tier one research, award winning interdisciplinary programs, strong industry collaborations, and an unwavering passion for student academic and post-graduation success. RCEAS is among a small number of engineering colleges that emphasizes outstanding undergraduate education and a research-intensive program.

In recent years, RCEAS has experienced significant enrollment growth, launched highly innovative academic initiatives, recruited nationally recognized faculty, and is preparing to announce the most transformational capital campaign in the college’s history.

This especially attractive decanal position offers an opportunity to redefine the future of engineering at Lehigh, while positioning Lehigh as a national/global model for innovative excellence in engineering research and education. To guide this transformation, Lehigh seeks a creative and inspiring leader, a bold and strategic thinker, an effective and socially adept manager, and a recognized scholar to serve as its next Dean.

The new Dean will take the helm of a school of engineering and applied science that consistently ranks among the top 50 engineering schools in the country, owing largely to the fact that its

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faculty include world-renowned scholars at all ranks. In addition, notable alumni include Lee Iacocca and Monroe “Jack” Rathbone, among a host of others. Tau Beta Pi, the renowned engineering honor society, was founded at Lehigh.

RCEAS is committed to Lehigh's overall strategic vision, which places particular emphasis on four of the world's grand challenges: the expanding needs of health and healthcare; the interrelated issues of energy, the environment and infrastructure; the impact of globalization; and developing post-industrial urban communities—particularly in its local community.

RCEAS is home to 140 faculty, 725 graduate students, and 1,850 undergraduate students. It offers 17 bachelor’s programs, six integrated or dual degree programs, 17 research master’s programs, four professional master’s programs and 13 Ph.D. programs. RCEAS is comprised of seven departments:

- Chemical and Biomolecular Engineering;
- Civil and Environmental Engineering;
- Computer Science and Engineering;
- Electrical and Computer Engineering;
- Industrial and Systems Engineering;
- Materials Science and Engineering; and
- Mechanical Engineering and Mechanics.

The college is also home to 19 research centers, labs and institutes. More information about RECAS is provided in the Appendix and available at http://www.lehigh.edu/engineering/

**Lehigh University at a Glance**

Founded in 1865 by Asa Packer, an industrial pioneer, entrepreneur and philanthropist, Lehigh University is a premier residential research university, ranked in the top tier of national research institutions each year. Lehigh is a coeducational, nondenominational, private university that offers a distinct academic environment of undergraduate and graduate students from across the globe. The University has nearly 4,900 undergraduate and 2,100 graduate students across its four colleges: the College of Arts and Sciences, the College of Business and Economics, the College of Education and the P.C. Rossin College of Engineering & Applied Science. Lehigh faculty members are world-class scholars, who are known for their excellence in research; the University has 681 total faculty, with 482 permanent, full-time faculty. Lehigh enjoys a small student-to-faculty ratio that allows faculty to work closely with students.

Lehigh is investing in a number of university initiatives, a sample of which include:

- **Data X** - Computer science and data analytics are increasingly driving discovery and opportunity at the intersection of multiple disciplines. At Lehigh, faculty and students are leveraging the university’s interdisciplinary strengths and utilizing computer and data science to push the boundaries of research, teaching and learning in such fields as bioengineering, data analytics and digital media.

- **Cluster Initiative** - Lehigh’s Cluster Initiative fosters collaboration through the development of small, cross-disciplinary disciplines and departments, organized around a common intellectual theme, issue or area of interest. Together, these scholars can
provide the critical mass necessary to cross new frontiers in teaching and research, while addressing some of the world's most pressing problems.

- **The Mountaintop Experience** - Inside a former Bethlehem Steel research facility atop South Mountain, Lehigh is creating a vibrant and unique learning environment—a space in which students are given the freedom to pursue answers to open-ended questions, while working in, and across, all disciplines. In the process, the students are challenged to increase their capacities for independent inquiry, for taking intellectual risks, for learning from failures, for collaboration, for recognizing important problems, and for taking opportunities to effect constructive and sustainable change.

Located in Pennsylvania’s scenic Lehigh Valley, the campus is in close proximity to both New York City and Philadelphia. The campus is composed of 2,358 acres, making it one of the largest private universities, by acreage, in the country. Its main campus is on the wooded northern slope of South Mountain; across all campuses are more than 147 buildings with 3.6 million-plus square feet of classroom, laboratory, and office and living space, and 180 acres of playing fields. About half of campus is preserved as open space. In 2012, the University received a Stabler Foundation gift of 755 acres in nearby Upper Saucon Township.

Lehigh Valley International Airport, served by most major airlines, is 15 minutes from campus. The Lehigh Valley is an especially attractive place to live and work with reasonable costs of living, easy commuting, excellent schools, and numerous cultural activities.

For years, Lehigh has ranked among those institutions with the highest rates of alumni annual giving in the nation, a particular point of pride. The University’s endowment is currently $1.2 billion.

For more information about the campus, please visit [www.lehigh.edu](http://www.lehigh.edu)

**Next Dean - Qualities and Qualifications**

The ideal candidate should have/be:

- A superb record of intellectual leadership and of distinguished scholarship and teaching, suitable for a tenured appointment as a full professor, and an earned doctorate or other terminal degree.
- A respected scholar/scientist/leader with an exceptional research background.
- Experience leading and managing an engineering or applied science school, department or comparable organization, exhibiting an innovative and results-oriented approach.
- An ability to inspire and energize RCEAS faculty, students, staff, and alumni.
- A dedication to creating an environment that is diverse, open, and inclusive.
- Experience with, or a demonstrated ability to grow relationships with donors and lead fundraising campaigns.
- Experience with, or ability to grow RCEAS’s research profile and relationships/collaborations with extramural sponsors, including but not limited to government, foundations, and industry.
- An ambitious vision for advancing RCEAS’s impact and rankings.
- Evidence of setting, building support for, and achieving an ambitious set of organizational goals.
• Outstanding interpersonal and communication skills that gain the confidence, trust and respect of a variety of internal and external constituents.
• High standards for performance and personal behavior.
• An appreciation for the history and mission of RCEAS and Lehigh University.
• The ability to serve as RCEAS’s chief spokesperson, and to articulate with conviction, the vision and impact of the college, in a clear and concise way.
• Experience collaborating with organizational stakeholders in an academic environment, including situations in which there are varying perspectives and priorities.
• A record of accomplishment in building effective academic leadership teams and recruiting, developing, and retaining faculty at all levels.
• A person of integrity, character, honesty, strong convictions, and resiliency.

The successful candidate for this position must have the inspiration, energy, and leadership necessary to take advantage of the extant strengths of RCEAS, and to propel the college to be one of the most respected and impactful in the world.

Application and Nomination Procedures
The Search Advisory Committee has 20 members, including twelve Engineering faculty, three faculty (one each) representing Lehigh’s other colleges, one Engineering Advisory Council member, one Lehigh University trustee, one Graduate student, one Undergraduate student, one Office of Multicultural Affairs staff, and one ex officio representative from the Office of the Provost. The Search Advisory Committee will review all candidates for the position of Dean, and will recommend the strongest candidates to the President and the Provost for final consideration.

Individuals who wish to apply should provide an electronic version of their curriculum vitae. All nominations and applications should be sent electronically (Microsoft Word or PDF attachments strongly preferred) to:

Dr. Ilene H. Nagel, Nate Haines, Charles E. Kaler
Consultants to the Search Committee
Russell Reynolds Associates
Higher Education Practice
Lehigh.Engineering@russellreynolds.com

The appointment date is open. However, to ensure full consideration, materials should be received as soon as possible. Review of nominations and applications for the position will commence immediately and continue until the position is filled.

References will not be contacted without the prior knowledge and approval of the candidate. All candidate information will be held in strict confidence until an announcement of the new Dean is made. To assure sensitivity toward the positions presently held by nominees and applicants, the search will be conducted in strict confidence until an appointment is made and announced.

Candidates are urged to review all information and documents posted on the Lehigh Engineering Search website, please visit http://www.lehigh.edu/rceasdeansearch

The material presented in this position profile should be relied on for informational purposes only. This material has been copied, compiled, or quoted in part from Lehigh University documents and personal interviews and is believed to be reliable. Naturally, while effort has been made to ensure the accuracy of this information, the original source documents and factual situations govern.
Appendix - RCEAS Departments and Programs/Centers/Institutes

DEPARTMENTS:

Chemical and Biomolecular Engineering

The Department of Chemical and Biomolecular Engineering is home to 18 full-time tenured/tenure-track faculty members, four Professors of Practice and several adjunct and jointly appointed faculty members with primary appointments in other departments. The department grants degrees at the B.S., M.S./M.Eng. and Ph.D. levels and awards M.S./M.Eng. degrees in Chemical Engineering, Biological Chemical Engineering and Chemical Energy Engineering. Over the last several years, the department has seen a marked growth in undergraduate student enrollment, driven by a great demand for the broad-based education and research experiences that students receive in the department. Currently, there are approximately 200 declared chemical engineering majors (sophomore through senior year), 55 Ph.D. students and about 40 M.S./M.Eng. students. The department has an active distance education program at the M.Eng. level.

Department faculty are recipients of four NSF CAREER awards, two former NSF PYI awards, the DOE Young Investigator Award, the AIChe Allan P. Colburn Award, the Sloan Research Fellowship, the AIChe CAST Outstanding Young Researcher Award, two Adhesion Society Excellence in Adhesion Awards, two AIChe CAST Computing Practice Awards, the AIChe Catalysis Practice Award, over 18 awards in the area of two phase boiling heat transfer, and three Humboldt Research Fellowships. One adjunct faculty is member of the US National Academy of Engineering. A broad range of government, private and foundation sources have funded faculty research including the National Science Foundation, National Institutes of Health, Department of Energy, Office of Naval Research, National Institute of Standards and Technology, State of Pennsylvania, Sloan Foundation, Petroleum Research Fund, and corporate research groups from ExxonMobil, DuPont, Michelin, Air Products and Chemicals, Praxair, 3M, and Dow Corning.

Students graduating from the department have documented an exceptional professional success record in academia -- alumni from the department currently or in the past have held academic appointments at Cornell University, Duke University, University of Maryland, Clarkson University, University of Akron, Mayo Clinic, University of Delaware, Pennsylvania State University/Hershey Medical Center and at a very large number of international universities. Notable industrial alumni from the department include a former CEO of Standard Oil, a Vice President of 3M, DuPont fellows, and a Vice President of OPower.

The research in the department is centered on four thematic areas that provide a comprehensive coverage of grand challenge problems in chemical and biomolecular engineering: (1) biomolecular/health/biomedical; (2) systems, information, modeling and simulation; (3) nanoscale science/materials/polymers; and (4) energy systems/catalysis/biofuels.

In the most recent NRC report released in 2010, the department was ranked 22nd in the nation.

Civil and Environmental Engineering

Lehigh University's Department of Civil and Environmental Engineering offers a robust, research-focused education in four different areas – environmental engineering, geotechnical engineering, structural engineering, and water resources engineering.

Among the department's 22 full-time faculty members are four active emeriti, five NSF CAREER-award recipients and two National Academy of Engineering members. Faculty research has been funded by organizations including the National Science Foundation,
Department of Defense, Department of Transportation, PA Department of Community and Economic Development, Philadelphia Water Department, Qatar National Research Fund, and National Cooperative Highway Research Program.

Many of the department’s graduates have gone on to successful and influential careers in academia at institutions such as the University of Illinois, University of Notre Dame, Princeton University, and University of Texas. Two of them have become members of the National Academy of Engineering. Additionally, the former President of the Ecole Polytechnique Federale De Lausanne (EPFL), Switzerland, and the current President of Clarkson University in Potsdam, New York, each received his Ph.D. in civil engineering at Lehigh.

The department occupies three world-class facilities:

Advanced Technology for Large Structural Systems (ATLSS) Engineering Research Center described below under Programs, Centers, and Institutes.

Fritz Laboratory – Materials and structural pieces used at the Panama Canal and Golden Gate Bridge, among other famous structures, have been tested at this lab, named after one of Lehigh's original trustees. This widely known research/testing facility received the designation of National Historic Civil Engineering Landmark by the American Society of Civil Engineers (ASCE) in 1992.

STEPS – Lehigh's "green" facility and programmatic initiative for science, technology, environment, policy, and society is the campus's newest building, dedicated in 2010, and home of the environmental engineering research labs and offices.

Computer Science and Engineering

Founded in 2001, the Department of Computer Science and Engineering (CSE) consists of 14 tenured/tenure-track faculty members and four Professors of Practice. The department grants Computer Science degrees at the Ph.D. and M.S./M.Eng. levels through RCEAS, and at the B.S. level through both RCEAS and the College of Arts and Sciences. With Electrical and Computer Engineering, it co-runs the Computer Engineering degree programs at all levels, and with the College of Business and Economics, it runs the Computer Science and Business B.S. degree. Enrollments in CSE are exploding at Lehigh as they are at many other universities around the country, with the department currently serving over 450 undergraduates and close to 100 graduate students.

The department faculty include six NSF CAREER awardees, two fellows of the IEEE, and one ACM fellow. Governmental sources of funding for CSE research include DARPA, NSF, DoE, NIH, NRL, and PITA. The department has also received funding from Google, Comcast, Microsoft, Intel, Air Products, Avaya, Cigna, PPL, and many other companies.

Research in the department covers broad areas of core and applied research in Artificial Intelligence, Bioinformatics, Computer Systems, Computer Vision, Databases, Information Systems, Networking, Robotics, Security, and Web Systems. CSE Faculty are engaged in active research collaborations with industry and with interdisciplinary partners throughout the four colleges at Lehigh. The CSE Department also serves as a focus for Lehigh's new Data X strategic initiative.

Electrical and Computer Engineering

The Department of Electrical and Computer Engineering (ECE) pursues a robust program of interdisciplinary research, with distinguished faculty members at the frontiers in their fields. ECE’s rising junior faculty have secured prestigious grants from funding agencies such as the
National Science Foundation, National Institutes of Health, Department of Defense, and Department of Energy. ECE faculty have been recipients of five NSF CAREER awards, one PECASE award, and one ONR Young Investigator Award. ECE has produced academics who hold faculty positions in Stanford University, University of California Santa Barbara, Georgia Institute of Technology, University at Buffalo, Case Western Reserve, and Rochester Institute of Technology. Several ECE faculty members have won national awards such as the IEEE Third Millennium Medal and the IEEE Photonics Society Distinguished Service Award. Four were elected Fellows of the Institute of Electrical and Electronic Engineers, two Fellows of the Optical Society of America, and one Fellow of the American Institute of Medical and Biological Engineering. One emeritus faculty is a member in the National Academy of Engineering. ECE’s strength is in integrative, cross-disciplinary research involving strong interactions between electrical and computer engineering and other engineering disciplines, the physical sciences, and biological science. ECE faculty provide leadership to major integrative research activities on campus such as the Center for Photonics and Nanoelectronics and the Integrated Networks for Electricity Cluster.

**Industrial and Systems Engineering**
Lehigh was the second university in the United States to launch an Industrial Engineering program. Today, the Industrial and Systems Engineering (ISE) Department is a highly ranked, high research intensity department.

While building on a long manufacturing, automation, robotics and informatics traditions, the department in 2011 declared analytics as its strategic direction, both in research and education. ISE graduates have deep quantitative and extensive technology skills, and take a “systems perspective” – assessing all of the inputs and outputs, people, money, machines, information, resources, and time – in order to make optimized decisions. To recognize its excellence and innovative program developments, the department was four times a finalist for the UPS-INFORMS George D. Smith Prize competition. After intense growth, ISE currently graduates annually over 65 undergraduate students, well over 200 Master’s students, and has approximately 45 Ph.D. students. At the Master’s level, numerous sector specific programs, such as Analytical Finance, Management Science and Engineering, Manufacturing Systems Engineering, and Healthcare Systems Engineering are offered. The last three degree programs are available fully online.

The department houses the Computational Optimization at Lehigh (COR@L) Lab, Enterprise Systems Center (ESC), and George Keane Manufacturing Lab.

ISE’s 17 tenured/tenure-track faculty are assuming leading positions in major societies, such as INFORMS, SIAM and MOS; are editorial board members of leading journals; and are writing popular text books and award winning research monographs.

**Materials Science and Engineering**
Materials Science and Engineering (MSE) is one of the longest established such departments in the U.S., and will be celebrating its 125-year anniversary in the Fall of 2015. MSE’s undergraduate program has been accredited by the Engineering Accreditation Commission of the Accrediting Board for Engineering and Technology (ABET) since 1936. MSE has 14 faculty members, 80 undergraduates (sophomore through senior year), and 52 graduate students (M.S. and Ph.D.). As a group, the MSE faculty is highly research active, with research expenditures exceeding $4 million in recent years. The faculty ranks include 14 Fellows of Professional Materials Societies, and six Editorships in leading journals. Many of the faculty have authored authoritative text books and have received national and international recognition. Lehigh’s
world-class Nanocharacterization Facility, which is led by MSE faculty members, has hosted one of the best known Microscopy Schools in the world since 1930. The department’s undergraduate and graduate students also have a long-standing tradition of participation and success in the annual International Metallographic Contests organized by ASM.

**Mechanical Engineering and Mechanics**

Mechanical Engineering and Mechanics (MEM) has 24 tenured/tenure-track faculty, with multiple having inter-departmental appointments, and six professors of practice. The department is home the Energy Research Center and the Technical Entrepreneurship Program. MEM currently has 410 undergraduate students and last year awarded 122 degrees. Its graduate student population is 206, of which 170 are full-time students. Last year, 36 M.S. and 18 Ph.D. degrees were awarded.

MEM faculty have 4 NSF CAREER awards and 5 ONR YIP awards. The department has approximately $3 million in research expenditures annually. Noteworthy research disciplines include:

- Additive manufacturing
- Biomechanics
- Control of fusion
- Control of power systems
- Energy: solar, renewable, fossil fuels
- Fluid dynamics
- Fluid – structure interactions
- Life cycle assessment and reliability
- Mechanics of materials: atomistic to macroscopic modeling
- Nature inspired mechanics
- Structural composites
- Tribology, lubrication, wear

Laboratories at the graduate level are associated with most of the foregoing research disciplines. At the undergraduate level, laboratories exist in the areas of thermodynamics, mechanical systems, solid mechanics, fluid mechanics, and manufacturing. These laboratories, as well as graduate and undergraduate projects, are supported by shops, machining facilities, and computer-aided design laboratories.

**PROGRAMS, CENTERS AND INSTITUTES:**

**ADVANCE Grant**

Lehigh was the first private, midsized research-intensive institution to be awarded a National Science Foundation ADVANCE Institutional Transformation grant. ADVANCE at Lehigh is instrumental in supporting women STEM faculty by providing professional development and networking opportunities, coordinating institutional-level mentoring for new and mid-career faculty, assisting search committees to incorporate best practices during faculty recruitment, and strengthening Lehigh’s ability to address dual career challenges through enhancing internal...
processes and contributing to the development of a new regional consortium (LINC) aimed to support relocation transitions. Lehigh ADVANCE is also active in engaging faculty, department chairs, and administrators in ways to strengthen an inclusive campus climate and culture that supports the success of all faculty. Lehigh University is a recognized thought leader on STEM faculty gender equity, and the ADVANCE leadership team has been invited to present papers and serve on panels at numerous national and international conferences over the past five years.

**Advanced Technology for Large Structural Systems**

Lehigh University’s Advanced Technology for Large Structural Systems (ATLSS) Engineering Research Center is a national center focused on performance of the nation’s infrastructure, with an emphasis on large-structural systems. The ATLSS Center was established in May 1986 within the NSF Engineering Research Center (ERC) program, and operated for 11 years with NSF ERC funding. ATLSS has addressed research goals of the National Science Foundation, Department of Transportation, Department of Defense, and Commonwealth of Pennsylvania, as well as numerous other government agencies, private companies, and industry-wide organizations. Large-scale experiments are an important feature of the ATLSS Center, and its laboratories are a unique national resource. From 2004 through 2014, ATLSS housed the real-time multi-directional (RTMD) earthquake simulation facility, which was one of 14 laboratories within the NSF’s George E. Brown, Jr. Network for Earthquake Engineering Simulation (NEES). The RTMD facility enabled researchers from across the U.S. to use ATLSS laboratories with NSF funding. Currently, ATLSS is competing to be one of six national laboratories for earthquake engineering and wind engineering research, within NSF’s Natural Hazards Engineering Research Infrastructure (NHERI) program. In addition, ATLSS Center researchers are well known for theoretical and numerical research contributions, with a current focus on community resilience to natural and other hazards. Total expenditures at the ATLSS Center over the past 15 years exceed $100 million.

**Bioengineering Program**

Bioengineering is one of youngest and fastest growing programs in RCEAS. In 2002, its undergraduate program was established. It has grown steadily to matriculate some fifty students every year. In 2010, a Bioengineering graduate program was established and it is growing steadily. Bioengineering is a cross-disciplinary program, drawing core and associated faculty from both RCEAS and the CAS. The program has steadily added new faculty members over the last several years and has built a strong research identity around technology for health, including novel materials for therapies, devices, and a systems approach to bioengineering. Bioengineering is closely involved in the Lehigh Data X initiative, which will support the program’s growth in research and education at the interface between computer science and bioengineering.

**Center for Advanced Materials and Nanotechnology**

The Center for Advanced Materials and Nanotechnology (CAMN) is a multi-disciplinary hub for research and education at Lehigh, with a mission to foster fundamental and applied research focused on the development and characterization of materials and processes, support cross-disciplinary collaboration and synergy, and pursue broad integrative research center activities and funding. CAMN represents all material-focused research at Lehigh across two colleges and multiple departments, and includes faculty members primarily from the departments of Materials Science and Engineering, Chemical and Biomolecular Engineering, Mechanical Engineering and Mechanics, Electrical and Computer Engineering, Physics, and Chemistry. Selected areas of emphasis include metals processing for the energy and transportation industries, glass synthesis and processing for biomedical and optical computing applications, particle synthesis for catalysis, optoelectronic, and energy applications, nanoscale characterization of surfaces and
interfaces, fabrication of soft materials for medical diagnostic devices, fracture mechanics of reinforced polymers for microelectronics and structural products, fabrication of polymer composite aeronautical and naval vessels, synthesis of membranes for fuel cells, and synthesis and characterization of optically active materials for lighting and sensing applications. CAMN operates an Industrial Liaison Program that provides opportunities for industry, government, and academic partners to access Lehigh equipment and expertise in the areas of material synthesis and characterization. The facilities represented by CAMN include the Electron Microscopy Facility, one of the country's best facilities for characterization of materials at the micro- and nano-scale.

**Center for Manufacturing Systems Engineering**

The predominant activity of the Center for Manufacturing Systems Engineering (CMSE) is a cross-disciplinary graduate program leading to a Master of Science degree in Manufacturing Systems Engineering. The MSE program has over 400 graduates. It is designed for experienced and mature engineers to assist them in developing an appreciation and broad-based understanding of the latest manufacturing technologies and practices, and equipping them with effective knowledge and abilities in business, communication, teamwork, finance, and marketing strategies practiced by U.S. and global industries. Students who enroll in the program typically gain increased maturity, improved communications skills, and advanced understanding of business and strategic programs. Students must have industrial experience, and are frequently sponsored by their employers. Students undertake associated research projects of value to their sponsoring company. They work together and in collaborative teams using classroom learning to solve real time problems. Courses are offered on campus, via classroom, and asynchronously to locations throughout the world. Courses in agile and lean manufacturing, e-commerce, international supply-chain management, sustainability, and other current topics are immediately applicable in the workplace. Faculty affiliated with the program represent departments from RCEAS, College of Business and Economics, and College of Arts and Sciences. All have extensive backgrounds in technology transfer with industry.

**Center for Photonics and Nanoelectronics**

The Center for Photonics and Nanoelectronics (CPN) formed from the merger of two long-standing centers (Center for Optical Technologies / COT, and Sherman Fairchild Center for Solid State Studies / SFC). Both SFC and COT have a long history of innovation and scientific advances tracing back to the late 1970s and early 2000s, respectively. The merged center CPN inherits the faculty (diverse expertise and core technical backgrounds), students, facilities, resources, reputation, history, and legacy (faculty alumni and student alumni connections) of both Center for Optical Technologies (COT) and Sherman Fairchild Center (SFC). The success of the former Center leaderships in establishing both COT and SFC as the leading programs in photonics and solid state electronics, respectively, has provided a solid foundation for the CPN leadership to advance further in advancing and integrating the science and technologies of photonics and nanoelectronics.

The Center for Photonics and Nanoelectronics (CPN) has more than 23 highly-research active tenure-track / tenured core faculty members spanning in four different departments (Electrical and Computer Engineering, Material Sciences Engineering, Physics, and Chemistry). The investments in multiple faculty hiring, new facility enhancement, and targeted research-education areas within the CPN result in the significant build-up in the activities in the enabling technologies and sciences for addressing new application directions. Faculty are working to build cluster collaborations in photonics / optoelectronics / nanoelectronics.
The CPN’s central mission is to produce first-rate and highly-competitive Ph.D. graduates in the fields of photonics, optoelectronics, and nanoelectronics, and applications of these core technologies (energy, medical, communications, and environments). The CPN has produced more than 75 Ph.D. graduates during the past decade, and eight of our alumni (graduate student / postdoctoral fellows / faculty) have been elected as members of the Academies (NAE, NAS, Royal Society, and Canadian Academy of Engineering). Significant research activities exist within the Center for Photonics and Nanoelectronics, and the current strengths span from III-Nitride and compound semiconductor technologies, organic based electronics and photonics, bio-related materials and devices, nonlinear optics, plasmonic and metamaterials, and flexible photonics technologies.

The CPN operates the integrated nanofabrication and cleanroom facility at Lehigh. The Integrated Shared Facility provides tremendous access for MOCVD epitaxy, cleanroom fabrication, nanofabrication, packaging capabilities, and device characterizations / measurements for photonics / optoelectronics / nanoelectronics devices. The Integrated Facility is run by a set of highly accomplished technical staff, and the access to this facility is available for faculty at Lehigh, faculty from other universities, and industrial users.

The CPN faculty actively seeks to collaborate on groundbreaking research work with external faculty members, partners in national laboratories, and partners in industry. The broad topics pursued within CPN in photonics, optoelectronics, and nanoelectronics areas provide opportunities to develop complementary research from basic sciences, materials, devices, integrated systems, and applications. The attractive industrial membership program in supporting research at Lehigh is also available.

**Center for Polymer Science and Engineering**

The Center for Polymer Science and Engineering (CPSE) offers a unique environment for graduate study -- one that is large enough to boast world-class professors and research facilities, but is small enough to give each student individualized attention. CPSE consists of faculty members from the departments of Chemical and Biomolecular Engineering, Chemistry, Materials Science and Engineering, Mechanical Engineering and Mechanics, and Physics. The major laboratory facilities are located across campus including Iaccoca Hall, Packard Lab, Seeley Mudd, and Whitaker Lab. In addition to polymer research, graduate students can earn the following degrees in polymer science and engineering: Master of Science (M.S.), Master of Engineering (M.E.), and Doctor of Philosophy (Ph.D.). CPSE is very active in Lehigh's Distance Education program.

**Computer Engineering Program**

Computer Engineering core and associated faculty are drawn from both the Computer Science and Engineering (CSE) and Electrical and Computer Engineering (ECE) departments in RCEAS; their research interests cover all major aspects of the field, e.g. embedded system design, robotics, wireless networking, sensor networks, and VLSI. CompE prepares students for careers in established and emerging fields that require combining hardware and software skills.

The B.S. degree in Computer Engineering is accredited by the Engineering Commission of ABET. This undergraduate computer-engineering program strongly encourages experiential learning via undergraduate research, summer internships, and participation in team-based design projects through senior design projects and possibly Lehigh's Integrated Product Design (IPD) program.
**Computer Science and Business**

The Computer Science and Business (CSB) Program is offered jointly by the College of Business and Economics (CBE) and the department of Computer Science and Engineering (CSE). The CSB degree is a single major, but dually accredited, in business by AACSB International, the Association to Advance Collegiate Schools of Business, and in computer science by the Computing Accreditation Commission of ABET. CSB is the only degree anywhere with this dual accreditation. The CSB program prepares students for three distinct career paths: (1) a pure computer science-oriented path of graduate study and/or employment with large software firms, startups, and everything in between; (2) a pure business-oriented path of employment in finance, accounting, Wall Street firms, supply chain, etc.; (3) a distinctive career path that truly integrates the two disciplines, including regulatory compliance, forensic accounting, and risk management departments of public accounting firms. The CSB capstone project features partnerships with enterprises around the world in which students create innovative software solutions for real problems in the partner enterprises. There are currently well over 200 students enrolled in CSB.

**Energy Research Center**

The Energy Research Center (ERC) is a multidisciplinary research group that involves professional staff, faculty and students at Lehigh University. The ERC serves as a focal point for energy-related research, education, and collaboration, with an emphasis on electric power generation, clean coal research and renewable energy. The Center pursues fundamental and applied research, technological development, and demonstration and commercialization of technologies for the efficient use of fossil energy sources, reducing the impact of pollutant emissions from power plants, increasing plant availability, extending plant/process/component life cycles, reducing operational and maintenance costs, and researching and integrating renewables to the energy matrix. The ERC works in collaboration with a broad set of government, industry, and academic partners, including the Department of Energy, the Environmental Protection Agency, the Electric Power Research Institute, electric power generation companies, Office of Emergency Management and service suppliers to the utility industry, as well as other aligned energy companies.

**Integrated Networks for Electricity Cluster and Energy Systems Engineering Institute**

The Integrated Networks for Electricity (INE) Cluster was one of the first two interdisciplinary collaborations formed by Lehigh’s Cluster Initiative. The INE cluster focuses on advancing study at the interface of the three interrelated networks: electricity, communications and economic that govern the ultimate performance of all smart grid/energy systems. The cluster has received a significant amount of National Science Foundation funding in its very young history. The Energy Systems Engineering Institute (ESEI), is a unique master’s degree program that is tightly coupled to the INE cluster. The ESEI program addresses the need for highly trained energy systems engineers in the energy area to replace the expected rapid retirements and to produce the needed engineers to focus the industry on high tech innovations, like smart grid, which will revolutionize the energy industry. ESEI students have gone on to Ph.D. study with INE cluster faculty after working with INE cluster faculty for their M.S. degrees. These students are also highly sought by industry.

**Health Research Hub**

Consistent with national and international trends, Lehigh University has seen a steady and progressive enhancement of its capability in health-related research over the last decade and longer. This includes growth of biological sciences, establishment of the bioengineering
program, and a significant increase in health-related research in nearly all science and engineering departments, under the aegis of several university-wide initiatives, including the life sciences/biotechnology 20/20 initiative and the Health Care Initiative. For technology related issues in health-related research we developed a vision for the role that Lehigh can play. Specifically, matching Lehigh strengths to constraints, we developed a strategic plan with a focus on novel devices, materials, and a systems approach for precision diagnostics and materials. A critical part of implementation of this plan has meant enhancing the newly established Health Research Hub (HRH) to significantly improve the competitiveness of Lehigh University in health related research. It does so by providing integrated and shared facilities for cell/tissue culture, soft lithography or microfabrication, and characterization. Lehigh HRH was commissioned in 2013 and comprises three shared laboratories and significant flexible laboratory space. It has been designed to foster and encourage collaborative health-related research. The HRH is primed to serve its function as a hub for collaborative and interdisciplinary health-related research at Lehigh. With the built-in infrastructure of the shared laboratories (e.g., hoods, benches, gas and vacuum supply, etc.), the cell/tissue culture, microfab and imaging facilities have been equipped with cutting-edge instruments and the HRH is attracting more and more users from both Lehigh campuses at Mountaintop and Asa Packer.

**Healthcare Systems Engineering Program**

Healthcare Systems Engineering is a professional master’s degree program designed to prepare graduate students for engineering and management careers in organizations engaged in delivering healthcare and health related products and services. The need for professionals in this area is strong and growing due to the aging of the population and a national crisis of rapidly increasing healthcare costs. The program provides students with the necessary background, specialized knowledge and management skills required to identify inefficiencies in healthcare systems and propose appropriate alternatives to reduce cost, increase efficiency and improve the overall quality of our health care system.

**Howard Hughes Medical Institute Program**

Since 1989 Lehigh University has been the recipient of six Howard Hughes Medical Institute (HHMI) awards totaling $8.9 million for science education from competitions among major research universities. Initiated in the Biological Sciences Department, within the College of Arts and Sciences, the HHMI has rapidly grown into a vibrant interdisciplinary student research experience involving nearly equal participation from RCEAS faculty. The university has been recognized for leadership in curricular innovation and science education that has engaged STEM undergraduates in both apprentice- and course-based research experiences. A focus on expanding interdisciplinary curricular and research opportunities that promote integration of disciplines and collaborative research experiences between science and engineering faculty and students has been the hallmark of Lehigh’s HHMI programs. HHMI program components have focused on: developing introductory and advanced courses that include inquiry-based learning pedagogies and integration of faculty research and teaching; retention of underrepresented groups in STEM; broadening access of students to collaborative research experiences during the academic year and summer that bridge multiple STEM fields; and fostering cooperative relationships with STEM faculty and students at local community colleges. Lehigh’s HHMI programs have been instrumental in strengthening research collaborations between science and engineering faculty and engaging STEM students in collaborative research.
Institute for Metal Forming

The main research objective of the Institute for Metal Forming (IMF) is to conduct cross-disciplinary process engineering studies to better understand and control forming and processing techniques and their impact on the microstructural response of a material in various technological processes. Classical metal forming research has been expanded to involve projects in powder processing including additive manufacturing, machining, microstructure analysis and characterization as well as forming of glasses, composites and ceramics. The emphasis is on both physical and numerical modeling of materials processing, process optimization as well as on microstructure development.

The IMF is intensely involved in graduate and undergraduate education and training for technical staff from industry. The interdisciplinary nature of IMF research includes co-investigated projects with students and faculty from the departments of materials science and engineering, mechanical engineering and mechanics, chemical engineering, industrial and systems engineering, and physics at Lehigh and other universities. The Institute's steadily growing base of equipment and expertise facilitates academic- and industry-related research in fields including manufacturing, biomaterials, material design as well as materials modeling.

International scientists and graduate students from North and South Americas, Asia, Europe, and Oceana are actively involved in IMF research spending their time on Lehigh’s campus.

The IMF receives the generous support of the Loewy Family Foundation through endowment at Lehigh, federal and state agencies, private foundations and trade organizations as well as industrial companies.

International Materials Institute for New Functionality in Glass

Lehigh’s International Materials Institute for New Functionality in Glass (IMI-NFG) was founded in 2004 on a program by the same name and sponsored by the National Science Foundation under an initiative to advance materials research globally by enhancing coordinated international collaboration between U.S. researchers and educators and their counterparts worldwide. The Institute’s long-term goal is the creation of a worldwide network in glass research for new applications, and the development of a new generation of scientists and engineers with enhanced international leadership capabilities. Among all the IMI’s established in the country, IMI-NFG is the only one dedicated to a single class of materials. Specifically on campus, it promotes new activities in glass research through international and national collaborations, and the development of new approaches to the education of glass. Faculty and students from various Departments of RCEAS participate in its activities listed below. IMI's major programs include:

- International Research Exchange Program (which formed a network of glass researchers in 40 countries)
- Development of Educational Material (>300 videos forming the most comprehensive resource in the world)
- Research Experience for Undergraduates (REU)
- International Conference Travel Scholarship for undergraduate, graduate and postdoctoral researchers at US universities
- Research Experience for Teachers (RET)

Among all the IMI's established by NSF, IMI-NFG is considered to be among the top in regard to its impact on the field. As NSF's support for IMI's end, our goal is to build on IMI's national
leadership in the field of glass and the worldwide network of glass researchers a more Lehigh
centric program such a national center of excellence in glass.

**Master of Engineering in Structural Engineering Program**

The Master of Engineering in Structural Engineering Program is a 10-month, 30-credit project-based program aimed at preparing students for careers in structural engineering practice. The curriculum excels at balancing the theoretical with the practical, combining coursework with a group project in which students design a real-world structure, such as a high-rise or a hospital. A full time professor of practice, draws upon 12 years of industry experience to teach a three-course sequence that focuses on the safe and efficient design of real-world structures. Students gain professional perspective from an Industry Advisory Council that advises the professor of practice, mentors students, and critiques design project presentations. Classroom learning is enhanced through full-scale testing of structural members in our laboratory, as well as frequent seminars from practicing engineers, and field trips to construction sites. Students graduate prepared to address the myriad performance, cost, and public welfare decisions involved in large-scale structural engineering projects.

**Technical Entrepreneurship Program**

Lehigh University offers a graduate Masters of Engineering in Technical Entrepreneurship (TE) and undergraduate courses including interdisciplinary capstone project courses. TE courses provide students from any major the opportunity for professional development of the entrepreneurial mindset with education and professional training in the art and practice of creating new companies while bringing revolutionary products and services to market. TE courses are interdisciplinary by design and open to all majors. The program develops what is known at the “T” professional, one with both the depth of a major and the breadth of how to apply technical solutions in a business, social and global context. The professional master’s targets individuals of any age who want to explore entrepreneurship and/or the application of the entrepreneurial mindset in a corporate environment, also known as intrapreneurship. For 2015 the undergraduate capstone courses includes 235 students that form 33 teams working on 24 projects from 20 sponsors supported by 17 team advisers (5 faculty and 12 paid graduates students) and 17 senior peer mentors.

Both the undergraduate capstone courses and the graduate TE masters of engineering program have won national recognition for excellence in providing real-world experience to our students (2012 National Academy of Engineering) and for providing a leading edge example of campus transformation for economic prosperity (University Economic Development Association, 2013 Award for Excellence in Talent Development). TE students are regularly featured in RCEAS, university and national publications.