

**NOMINATION COVER SHEET**

**2011 Virginia Outstanding Faculty Awards**

<b>1. NAME</b>	
Full (Legal): Gary L. Downey	Preferred First Name: Gary
<b>2. INSTITUTIONAL INFORMATION</b>	<b>3. PROFESSIONAL INFORMATION</b>
Institution: Virginia Polytechnic Institute and State University	Academic Discipline: Science and Technology Studies
Rank/Position Title: Alumni Distinguished Professor	Specialization/Field: Engineering Studies
Year Rank/Title Attained: 2007	Type of Terminal Degree: Ph.D.
Years at Institution: 27	Year Awarded: 1981
Campus Email Address: downeyg@vt.edu	Awarding Institution: The University of Chicago
Campus Phone: 231-4761	[REDACTED]
Campus Mailing Address: Department of Science and Technology in Society, 332 Lane Hall - 0247	[REDACTED]
Campus Communications Contact:	[REDACTED]
Name: Larry Hincker	[REDACTED]
E-mail: hincker@vt.edu	[REDACTED]

**Please check only one box:**

- RESEARCH/DOCTORAL INSTITUTION NOMINEE:
- MASTERS/COMPREHENSIVE INSTITUTION NOMINEE:
- BACCALAUREATE INSTITUTION NOMINEE:
- TWO-YEAR INSTITUTION NOMINEE:
- RISING STAR NOMINEE:

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Signature (President or Chief Academic Officer) \_\_\_\_\_

Printed Name: \_\_\_\_\_

E-mail address: \_\_\_\_\_ Telephone: \_\_\_\_\_

## **II. MISSION STATEMENT**

Virginia Polytechnic Institute and State University (Virginia Tech) is a public land-grant university serving the Commonwealth of Virginia, the nation, and the world community. The discovery and dissemination of new knowledge are central to its mission. Through its focus on teaching and learning, research and outreach, the university creates, conveys, and applies knowledge to expand personal growth and opportunity, advance social and community development, foster economic competitiveness, and improve the quality of life.

Adopted by the Board of Visitors, June 4, 2001; revised in 2006.

### **III. SUMMARY OF ACCOMPLISHMENTS**

#### **INTRODUCTION**

Alumni Distinguished Professor Gary Downey is the nation's leading scholar in global engineering education. His amazingly creative program of teaching and research in interdisciplinary Science and Technology Studies (STS) has successfully bridged a daunting gap in higher education between engineering and the liberal arts. He developed and shared with colleagues across the country an innovative approach to engineering education that enables learners to better understand and analyze the broader value commitments in their technical work. He has built an entire academic subfield around his research on the knowledge and value commitments of engineers and engineering. His case becomes truly extraordinary when one understands that these accomplishments are but highlights of an astonishingly energetic and productive career.

Combining expertise in mechanical engineering (B.S. 1974 Lehigh U) and cultural anthropology (Ph.D. 1981 U Chicago), Dr. Downey developed a learning method—called “Location, Knowledge, Desire”—for helping engineers work more effectively with people who define problems differently, especially non-engineers. He built this method into the innovative course Engineering Cultures, whose classroom instruction and online multimedia modules have now helped prepare over 10,000 students and engineers for international and global work. Dr. Downey extended this method into a new overarching model for engineering curricula and practice—called “Problem Definition and Solution”—that highlights connections between knowledge contents and value commitments. Both the National Science Foundation and the Carnegie Foundation for the Advancement of Teaching have incorporated this model into program developments.

Dr. Downey's ethnographic and historical research on the cultural dimensions of engineering practices grounded a decade-long effort to develop the new subfield “Engineering Studies.” Dr. Downey organized the founding meetings, incorporated the professional society he still facilitates, founded and co-edits its main journal, and founded and edits two book series, all while continuing his own research. The numerous awards and funding by prestigious organizations Dr. Downey has received attest to the truly exceptional content and scope of this remarkably integrated scholarly enterprise of teaching, research, and service.

#### **TEACHING**

Dr. Downey has received virtually all the highest university-wide honors and awards for teaching excellence and innovation given at Virginia Tech. He was selected for each of these awards from pools of more than 1,400 faculty:

- Alumni Distinguished Professor for career excellence for teaching, research, and service (currently 8 total across the University).
- William E. Wine Award for career excellence in teaching (3 per year).
- Academy of Teaching Excellence, lifetime member, for teaching excellence (<7 per year).
- XCaliber Award, for excellence in teaching with technology (3 per year).
- Diggs Teaching Scholar Award for innovative scholarship in teaching (3 per year).

Three times he was awarded a Certificate of Teaching Excellence, the highest teaching award given by the College of Liberal Arts and Human Sciences.

Dr. Downey's cutting-edge insights into and contributions to engineering education and work have been recognized by the nation's leading organizations for engineering education, engineering, and education innovation:

- Sterling Olmsted Award, American Society for Engineering Education: the highest award given "for distinguished contributions to the liberal arts education of engineers."
- Boeing Company Senior Fellowship, National Academy of Engineering's Center for the Advancement of Scholarship in Engineering Education: for developing a new model of engineering as "problem definition and solution."
- Member, "Life of the Mind for Practice Seminar," Carnegie Foundation for the Advancement of Teaching: responsible for the inclusion of "problem definition in engineering education" in two prominent Carnegie reports.

Upon his arrival at Virginia Tech in 1983, Dr. Downey immediately began developing undergraduate STS courses to help engineering and science students understand the societal and value dimensions of their work. He also went to work building the STS Ph.D. program, successfully persuading colleagues to emphasize scholarship that engages societal problems in science and technology:

- Designed 15 new courses, including 6 while at the rank of Assistant Professor (see KNOWLEDGE INTEGRATION for a description of Engineering Cultures).
- Designed 1/3 of the original STS graduate degree program.
- Led, as Associate Professor, a complete redesign of the graduate curriculum, including designing 15 new courses.
- Led, as Professor and STS Director, a controversial but important revision of the degree structure, developing three new tracks at the master's level and four at the Ph.D. level.
- Organized a university-wide graduate course in research methodology, with workshops dealing with seven methods for 126 students from 11 departments.
- Made extensive contributions to reforming curricula in Interdisciplinary Studies; Women's Studies; Engineering Education; Engineering Science and Mechanics; Study Abroad (for engineers); and Public and International Affairs.

Dr. Skip Fuhrman, Professor and Chair, Department of Science and Technology Studies, said of Dr. Downey, "Gary is more than just the cornerstone of the department today. He is the chief curricular architect of our highly successful graduate program in Science and Technology Studies as well as adviser to more of our students than any other faculty member. His positive contributions to the graduate curriculum and program are staggering in scope. He has been an effective leader, moderator, and master of conflict resolution":

- 77 Ph.D. and M.S. committees: 38 as chair; currently 18 committees, 8 as chair.
- 8 of 10 Ph.D. advisees completed are teaching at universities; 1 a curator at the American Association for the Advancement of Science; 1 a postdoctoral fellow.
- 16 of 20 M.S. advisees completed were admitted to Ph.D. programs; 2 are in senior government positions (DOD engineer, NASA historian), 2 are in senior industry positions (Microsoft software engineer, Teloquent software engineer).
- Co-founded with students the Virginia Tech Research in Engineering Studies Group.

Student assessments of Dr. Downey's teaching are consistently high despite taking on what Dr. Fuhrman described in 2007 as "what may be the most difficult pedagogical challenge at this institution, . . . persuading engineering students to value learning in the humanities and social sciences":

- 3.7 overall average (4.0 scale) on student evaluations for 27 years. Department averages have been 3.4 for undergraduate courses and 3.5 for graduate courses.
- 3.8 for "concern/respect for students" over 27 years.

Dr. Juan Lucena (Associate Professor, Colorado School of Mines) writes, “Professor Downey took the time and energy to teach me how to teach. He mentored me in syllabus development, lecture preparation, student-centered pedagogies, exam writing, grading, and listening to students’ fears and dreams with the goal of empowering them as engaged citizens. He made sure I clearly understood that teaching was not about the professor but about students’ learning and aspirations. His mentoring effectively translated into a successful teaching career for me.”

## DISCOVERY

Dr. Gary Gabriele, Dean of Engineering at Villanova, speaks for many colleagues when he writes, “I have been an enthusiastic supporter of Gary Downey’s work because I think if we are truly able to transform engineering education for the 21st century, we will look back at his writing as the seminal work that defined what we should be doing.”

Dr. Downey’s research not only makes a fundamental contribution to our understanding of engineers and engineering by revealing the social value commitments at the heart of technical problem solving. He translates his years of prolific international research into forms that engineering educators can use.

Dr. Downey began his career exploring value issues in public controversies over nuclear power and nuclear waste disposal. His dissertation research won him a prestigious Mellon Postdoctoral Fellowship at the National Academy of Sciences, where he contributed to a foundational report on the social and economic dimensions of radioactive waste management.

He then turned to exploring value commitments in engineering when he witnessed mechanical engineers championing the importance of computer-aided design and manufacturing technologies for national progress. His in-depth ethnography, *The Machine in Me: An Anthropologist Sits Among Computer Engineers*, won praise from reviewers for mapping the complex value tensions experienced by students and researchers who commit themselves to the technology:

- Downey’s introduction to the field is flawless. . . [He] quickly moves into a fascinating thick description of the professionals and students in CAD/CAM. . . Downey successfully links the conflicting psychological pressures on these proto-engineers—the initiation rituals of their subculture—with the same themes he finds in the CAD/CAM industry as a whole. . . . Both intriguing in analysis and rich in ethnographic data, *The Machine in Me* is a must for anyone interested in the anthropology of computing” (Ron Eglash, Rensselaer)
- “Downey has produced a most provocative analysis of the still emergent culture of CAD/CAM –machine and maker, student and users—based upon extensive fieldwork, often as a participant. More than an engaging ethnography, he provides a refreshing critique of contemporary social studies of technology and society. . . to author a most compelling story” (Louis Bucciarelli, MIT).
- “[T]his book makes an important contribution to the larger project of theorizing the relationship between technology and society.” . . Downey . . . looks at the patterns of intimate individual relationships between [engineering] users and CAD/CAM technology. . . . [H]e imagin[es] a world in which the dominant image of technology includes humans and machines in linked networks of agency” (Kevin Borg, U Delaware).
- “Engaged in earnest and honest dialogue with the engineers he studies and works with, Gary Downey shows us from the inside what working within a technology means to the lives of these [engineers]. Downey proposes . . . a vision of what a different world of technology and business might be. Admirable.” (Paul Rabinow, U California Berkeley).
- “Gary Downey’s analytic approach involves illuminating specific practices by placing them in a broader cultural context. His central focus is to specify the ways in which a nationalist discourse on CAD (e.g., as the way to save the competitive standing of the United States)

provides an implicit terrain on which students construct an understanding of what CAD is for and how it relates to them . . . [H]e is interested in the way that students' bodies become inscribed in the machines and the machines in the students' (and others') bodies. . . . Downey's approach is to demonstrate the value of a socio-cultural awareness to the education of budding engineers" (David Hakken, SUNY Utica).

Subsequent ethnographic research on engineering education yielded a corpus of publications that both assess the development and current state of engineering education in the United States and other countries and outline a shift to an emphasis on problem definition and solution:

- An NSF division director wrote, "I found [Downey's "Are Engineers Losing Control of Technology?"] one of the most compelling arguments for why and how engineering education needs to change. In fact, I believe it is a better summary than the two 2020 reports [published by the National Academy of Engineering (NAE) to guide reform in engineering education]. . . . I have passed it around . . . the Foundation and . . . intend to cite it in my talks on engineering education."
- Over the past several years, Dr. Downey has delivered 32 lectures on engineering education, including three at NSF, two at the Carnegie Foundation for the Advancement of Teaching, two at the National Academy of Engineering, five at international conferences, four at national conferences, and eight at other universities, including Cornell, Duke, Virginia, Illinois, Smith, Iowa State, Penn State, and National Tsing Hua in Taiwan.
- After a Keynote Lecture to the World Congress of Chemical Engineering in Scotland, the program chair reported, "I heard several say that your keynote was one of the highlights of the conference."
- A Distinguished Lecture to the American Society for Engineering Education showed how the problems of globalization, diversity, and leadership are linked in engineering curricula. The NAE director of research on engineering education reported it was "fabulous" and then invited Dr. Downey to present it again at their annual summer institute of engineering deans.
- A total of 8 invited distinguished/keynote lectures.

Dr. Downey has been enormously productive as a social science researcher:

- 54 publications, including 4 books, 3 special journal issues, 22 articles in refereed journals, 11 book chapters, 7 articles in refereed conference proceedings, 4 non-refereed articles, 3 published reports, and 3 book reviews.
- Fellow, American Anthropological Association ("for significant scholarly contributions to the field of anthropology")

Dr. Downey has an absolutely amazing record in grantsmanship from prestigious sources, especially given his location in the liberal arts. When a newly-arrived dean asked an associate dean which of the roughly twenty units in her college were most successful in external funding, he said, "Well, there's Human Development . . . and Gary Downey":

- 17 external grants (16 NSF, 1 NAE, 1 Boeing Company) totaling \$1.33M.

### **KNOWLEDGE INTEGRATION**

Dr. Downey's signature scholarly accomplishments in teaching and research on global engineering education build outward from his ingenious curricular work bridging the gap between engineering and the liberal arts.

The key initial activity was developing over a ten-year period the modular course experience called Engineering Cultures:

- All contents are the product of original research.
- Takes students on an odyssey through the histories of France, Germany, United Kingdom,

Russia, Japan, Korea, Mexico, and the United States.

- Shows how national variations in what it has meant to be an engineer and what engineers have valued as their knowledge have been linked to differing commitments to progress (e.g., expanding low-cost production for mass use, advancing toward perfection, rising above manual labor, avoiding subservience, emancipating God-given spirit, enhancing equality).
- Shows how technical engineering work always includes broader value commitments.
- Each module examines how engineers have been trained, what has counted as engineering knowledge, where engineers have worked, and key contemporary issues.
- The method “Location, Knowledge, Desire” trains students to value co-workers, especially non-engineers, by asking how they are located, what they know, and what they want.

Dr. Doris Zallen, STS Professor and SCHEV Outstanding Faculty Award winner, wrote in 2007, “I remember the first time he offered the course in 1995. The number of engineering students enrolled was small enough to fit into a modest-sized classroom. However, the word spread rapidly about the quality of his teaching and the new insights that could be gained. Hundreds of students tried to enroll the next semester. That level of enthusiasm for the course remains to this day.”

To meet the overwhelming demand, Dr. Downey painstakingly produced, edited, and perfected multimedia learning modules. He made these available for free in 2008 at a global engineering education website managed at Purdue University:

- Multimedia version includes 36 hours of video, text, and images in 7 modules; 520pp script.
- Ranked #2 of 190 contributors to *GlobalHub.org*. Over 2,300 extended page views (defined as > 15 minutes), with the rate of use increasing quickly.

Dr. Downey devoted enormous effort to mentoring 19 Ph.D. students to teach Engineering Cultures, helping individual students take initial steps toward global competency:

- 9 have taught their own versions to over 2,000 students in 44 sections, including 18 online, 9 at Colorado School of Mines, and 3 at Embry-Riddle Aeronautical University.

Dr. Downey has rigorously researched student learning in Engineering Cultures, publishing findings in three articles:

- Pre/post-test in 4 classroom (126 students) and 2 online (50 students) sections  
Measured: “ability to analyze how national differences affect engineering work”  
Instrument: essay scenario at an Airbus manufacturing plant to judge preparation  
Post: 90% Adequate/Excellent 10% Inadequate/Needs Improvement  
Pre: 9% Adequate/Excellent 91% Inadequate/Needs Improvement
- Final survey (strongly agree/agree; disagree/strongly disagree)  
“Gained significant knowledge”: 95% agree 5% disagree  
“Better prepared to work w/others”: 97% agree 3% disagree  
“Better understand myself”: 97% agree 3% disagree  
“Better prepared to engage differences”: 95% agree 5% disagree

Interviews with Dr. Downey exploring his approach to global engineering education have appeared in the *Professional Engineer* magazine, *Mechanical Engineering* magazine, *tce* (*The Chemical Engineer*), and *SWE Magazine* (Society of Women Engineers), among others.

One undergraduate student wrote, “[Dr. Downey’s] Engineering Cultures course changed my life. I walked into the first class wondering how, as an engineer, I could fulfill my dreams of serving society in a meaningful way. I walked out of the last class knowing what I needed to do to be satisfied and successful as an engineer.”

During the past decade, Dr. Downey has built Engineering Studies as a subfield of scholarship examining relations between the technical and nontechnical dimensions of engineering practice:

- Organized two international meetings to coalesce research in Engineering Studies.
- Built an Engineering Studies listserv with 300 members.
- Incorporated the International Network for Engineering Studies (INES).
- Founded and co-edits the journal *Engineering Studies*, published three times per year by Taylor & Francis/Routledge.
- Founded and edits the *Engineering Studies Series*, published by MIT Press (one of the top presses in STS research).
- Founded and edits the *Global Engineering* book series, published by Morgan & Claypool Publishers (using a unique online platform for rapid, inexpensive delivery to students).

## SERVICE

Dr. Downey equates leadership with service and defines service as the difficult, often invisible, work of scaling up practices beyond localized origins to achieve broader impact. He is a leader.

### **University Service**

Dr. Downey's service work to Virginia Tech is unsurpassed among its faculty:

- Includes 169 year-long committees and projects.
- Contributions to the Provost, Graduate School, Research Division, Academy of Teaching Excellence, Diggs Teaching Scholar Program, College of Engineering, College of Liberal Arts and Human Sciences, Center for Excellence in Undergraduate Teaching, STS Graduate Program, School of Public and International Affairs, Women's Studies Program, Department of Interdisciplinary Studies, Department of History, Center for Programs in the Humanities, and Department of Science and Technology in Society.
- Active member of Women's Studies and vocal advocate for diversity since 1995.
- Delivered Virginia Tech's December 2009 commencement address: "The Answer Is: My Mother, Angela Tincher, and Your Transcript." One colleague described it as "the smartest, most coherent, most meaningful, and most appropriate graduation speech I've ever heard."

### **Professional Service**

American Society for Engineering Education

- Chair/Vice-Chair/Program Chair, Liberal Education Division (2007-2010)
- Re-energized membership by increasing visibility for the Division

Society for Social Studies of Science

- Elected Council member (2003-2007)
- Led a study of effects of U.S. immigration policy
- Led, as Publications Committee chair, re-design and expansion of journal
- Served on 4 prize committees, chairing 1

National Academy of Engineering

- Led projects for Engineering Education Center (2003-2007)
- Led projects for Action Forum for Diversity in the Engineering Workforce (2000-2003)

Carnegie Foundation for the Advancement of Teaching

- Active member of the Advanced Study: "Liberal Arts and the Professions" (2002-2006)
- Contributor to the Foundation report: *Educating Engineers*

Dr. Downey has conducted 4 external reviews of departments (UC San Diego, Rensselaer, Michigan Tech, Embry-Riddle), 15 external promotion and tenure reviews (7 MIT, 5 Rensselaer), nearly 500 reviews of research proposals, and manuscripts for 12 journals.

#### **IV. PERSONAL STATEMENT**

During my twenty-seven year career at Virginia Tech, I have come to view the University as a collection of intellectual and cultural projects, each of which with a constituency beyond the boundaries of the institution. The most important work in these projects is pedagogical in content. Original research is essential, but its outcomes gain value only when others outside are persuaded of their value. The University fulfills its highest mission only when it fully recognizes it must collaborate with learners inside and outside the institution in order to help them.

The contours of my primary intellectual and cultural project emerged over time. Trained initially as a mechanical engineer at Lehigh University, I took a flying leap into cultural anthropology at the University of Chicago to learn how to map and engage perspectives that differed from my own. I had loved learning engineering and becoming an engineer. I was especially taken with its larger commitment to serve society through new knowledge and technologies. I also came to believe that an overriding focus on mathematical problem solving made it self-limiting. Learning engineering had the unintended consequence of inhibiting engineers from effectively engaging others who understood their work and defined problems differently.

I have devoted my career to overcoming this limitation, through two related pathways. One has involved scaling up local pedagogical experiments into multimedia learning experiences in global education for thousands of engineering students and working engineers. The other has involved designing and building an entirely new field of scholarship and teaching around the questions: What is engineering for? What are engineers for? I have been successful at finding ways of integrating into engineering education and work practices from the humanities and social sciences. The most difficult work has been building the scholarly institutions to scale up this work and enable it to continue beyond the boundaries of my own career.

In 1994, I decided it was finally time to try it. I had spent eleven years successfully developing and testing liberal arts courses and classroom strategies that challenged engineering and science students to better engage points of view held by others. The key step had been helping them recognize that they too occupied particular points of view that had both technical and nontechnical contents. This work was helping to build the new interdisciplinary field of Science and Technology Studies (STS). I had been attracted to STS after completing graduate work in cultural anthropology and a postdoctoral fellowship in technology policy at the National Academy of Sciences. The field's main focus on examining relations between the technical and nontechnical dimensions of problems involving science and technology captured my heart then and has held it ever since.

The big experiment was to develop a new undergraduate course specifically for engineers called Engineering Cultures. The course would help students become global engineers who understood and valued perspectives other than their own. The key strategy was to learn that what it means to be an engineer and what engineers value as their knowledge have varied dramatically over time and space. Students are always shocked to learn that where French engineers have tended to value theoretical knowledge and aspire to work in government where they constitute the highest-ranked occupation in the country, British engineers have tended to value practical knowledge and work in the private sector where they constitute a relatively low-ranked occupation.

Producing the modules required much original and integrative research. The result is a variable odyssey transporting students through the engineering histories of France, Germany, United Kingdom, Russia, Japan, Korea, Mexico, and the United States. As they move from place to place, students also master a method for engaging others called "Location, Knowledge, and Desire." Though extensive role-playing and other face-to-face and online devices, students

learn both to ask and to listen to how others are located, what they know, and what they want.

To reach more students at Virginia Tech than the 150 I accept into my course (of the 275 who regularly request it), I built a thirty-six hour, web-based “multimedia textbook” for others to use. I have now trained nineteen Ph.D. students to use it. Together, we have reached over 7,000 engineering students at Virginia Tech.

In 2008, I made five modules available for free at a hub for the global education of engineers sponsored by the National Science Foundation (NSF) and hosted at Purdue University. The number of users is approaching 2,500, at an accelerating rate.

I am now hard at work in three areas. One is developing new modules for the course on India and Egypt (a former student is working on China). The second is making all modules available in 100-page electronic textbooks I am publishing in the *Global Engineering* series I edit for Morgan & Claypool Publishers. I initiated the third in a 2005 keynote lecture to the World Congress of Chemical Engineering in Glasgow. It involves leading an effort to redefine engineering as “problem definition and solution” by integrating practices of collaborative problem definition across existing engineering curricula. The Carnegie Foundation for the Advancement of Teaching formally endorsed this position in 2009 in two prominent reports.

While conducting research in STS, I regularly confronted the view that engineering is uninteresting because it is downstream of science. I see the relationship as more of a collaboration. The comparatively small number of scholars in the basic sciences provide support for the huge communities working in engineering and the applied sciences, which are tightly connected to the myriad problems of everyday life. I have worked to make the service work of engineers and engineering more visible and effective by building a new scholarly field under the label *Engineering Studies*.

In 2003-2004, I led the founding in Paris of the International Network for Engineering Studies (INES), which I continue to coordinate. INES has grown to an organization of 300 scholars dedicated to humanities and social sciences studies of engineers and engineering. Hosting a NSF workshop with 50 scholars from seventeen countries in 2006 led me to establish the journal *Engineering Studies*, which Taylor & Francis began publishing in 2009. This spring I established a second book series, this time at MIT Press and titled *Engineering Studies Series*. This new Series provides the elite capstone for the field that hopefully guarantees its future.

A key objective of INES is “to link scholarly work in engineering studies to broader discussions and debates about engineering education, research, practice, policy, and representation.” Through my editorial work, I actively encourage scholars to pay vigilant attention to this objective. My founding manifesto for the journal, “What is Engineering Studies For?: Dominant Practices and Scalable Scholarship,” outlines practices of critical participation in engineering education and practice. Successful critical participation involves identifying dominant practices and then organizing scholarship to scale up alternative practices that can help engineers worldwide to understand and confront the myriad challenges they face in daily work. My book manuscript, *Servants of Progress: Engineering Formation and the Country*, now under review, shows that the development of engineering education has been fundamentally about the building of countries. This clarifies the difficult contemporary challenges in preparing global engineers, for engineers everywhere tend to carry their countries with them.

Finally, I view my primary responsibility in the STS graduate program as helping passionate and ambitious, but frequently uncertain, students gain the tools and confidence to tackle complex problems of science and technology in society. I take great pride in helping them map possible futures by reexamining past interests and experiences. I find it a pleasure helping them become knowledgeable and thoughtful researchers and teachers. It is also a great privilege to be able to learn from them in the process.

## V. ABBREVIATED CURRICULUM VITAE

### GARY LEE DOWNEY

#### EDUCATION

Ph.D.	1981	University of Chicago	Cultural Anthropology
M.A.	1977	University of Chicago	Cultural Anthropology
B.S.	1974	Lehigh University	Mechanical Engineering ( <i>summa cum laude</i> )
B.A.	1974	Lehigh University	Social Relations ( <i>summa cum laude</i> )

#### PROFESSIONAL EXPERIENCES

2007-present	Alumni Distinguished Professor, Science and Technology Studies, Virginia Tech
1999-2007	Professor, Science and Technology Studies, Virginia Tech
2004-2007	Senior Fellow, Center for the Advancement of Scholarship in Engineering Education, National Academy of Engineering
2004-present	Faculty Affiliate, Center for the Advancement of Scholarship in Engineering Education, National Academy of Engineering
2004-present	Affiliated Professor, Department of Engineering Education, College of Engineering, Virginia Tech
1996-present	Affiliated Professor, Women's and Gender Studies, Virginia Tech
1989-present	Adjunct Professor, Department of Sociology, Virginia Tech
1997-2000	Director, Center for Science and Technology Studies and Graduate Program in Science and Technology Studies (Blacksburg and Falls Church), Virginia Tech
1989-1999	Associate Professor, Science and Technology Studies, Virginia Tech
1983-1989	Assistant Professor, Science and Technology Studies, Virginia Tech
1981-1983	Assistant Professor, Science, Technology, and Society, Michigan Technological University
1980-1981	Mellon Foundation Postdoctoral Fellow, National Academy of Sciences/National Research Council, Washington, D.C.

#### HONORS AND AWARDS

##### ***National/International***

Sterling Olmsted Award, American Society for Engineering Education (2008) ("for distinguished contributions in the teaching of liberal arts in engineering education")  
8 distinguished or keynote lectures, including:  
Distinguished Lecture, Department of Mechanical Engineering, Penn State University (2010)  
Distinguished Lecture, American Society for Engineering Education (2006)  
Keynote Lecture, Engineering Research Centers, National Science Foundation (2006)  
Keynote Lecture, Engineering Leadership Institute, National Academy of Engineering (2006)  
Keynote Lecture, 7<sup>th</sup> World Congress of Chemical Engineering (2005; Glasgow, Scotland)  
Fellow, American Anthropological Association (1993) ("for significant scholarly contributions to the field of anthropology")

##### ***Virginia Tech***

Alumni Distinguished Professor, Virginia Tech (2007) (8 total of 1,400 faculty)  
Outstanding Dissertation Advisor Award, Humanities and Social Sciences (2007)  
William E. Wine Award (2004) (for career excellence in teaching)  
Academy of Teaching Excellence Lifetime Member (2004)  
XCaliber Award (2003) (for innovative scholarship in teaching with technology)  
Certificates of Teaching Excellence (1987, 1992, 2003) (for teaching excellence)

XCaliber Certificate of Excellence (2002) (for innovative scholarship in teaching with technology)  
Diggs Teaching Scholar Award, Virginia Tech (1997) (for innovative scholarship in teaching)

## **PUBLICATIONS**

### **Books**

G.L. Downey and K. Beddoes, eds., *What Is Global Engineering Education For?: The Making of International Educators* (San Rafael, CA: Morgan & Claypool Publishers, 2010)  
G.L. Downey, *Engineering Cultures* (video textbook, 520pp transcript, www.globalhub.org) (Blacksburg, Virginia: Virginia Tech, 2003)  
G.L. Downey, *The Machine in Me: An Anthropologist Sits among Computer Engineers* (New York: Routledge, 1998)  
G.L. Downey and J. Dumit, eds. *Cyborgs and Citadels: Anthropological Interventions in Emerging Sciences and Technologies* (Santa Fe, NM: The SAR Press, 1998).

### **Journal Special Issues (3: published in 2009, 2006, 1999)**

#### **Selected Articles and Book Chapters (40 in refereed journals and books)**

G.L. Downey, "What is Engineering Studies For?: Dominant Practices and Scalable Scholarship." *Engineering Studies* 1(1):55-76 (2009)  
G.L. Downey, J.C. Lucena, and C. Mitcham, "Engineering Ethics and Identity: Emerging Initiatives in Comparative Perspective" *Science and Engineering Ethics* 13(4):463-487 (2007)  
G.L. Downey, "Low Cost, Mass Use: American Engineers and the Metrics of Progress" *History and Technology* 22(September)3: 289-308 (2007)  
G.L. Downey *et al.*, "The Globally Competent Engineer: Working Effectively with People Who Define Problems Differently," *Journal of Engineering Education* 95(2):107-122 (2006)  
G.L. Downey, "Keynote Lecture: Are Engineers Losing Control of Technology?: From "Problem Solving" to "Problem Definition and Solution" in Engineering Education. *Chemical Engineering Research and Design* 83(A8):1-12 (2005)  
G.L. Downey and J.C. Lucena, "Knowledge and Professional Identity in Engineering" *History and Technology* 20(December)4:393-420 (2004)

#### **Scholarly Presentations (more than 100 since 1981)**

### **SELECTED EXTERNAL GRANTS (17 total; \$1,330,000)**

"Engineering Cultures: Expanding Global Competency," NSF 2010-2013 (\$167,800)  
"Engineering through Problem Definition and Solution," NSF 2006-2009 (\$199,400)  
"Engineers and the Metrics of Progress," NSF 2005-2009 (\$172,000)  
"Building Global Engineers through Multimedia Technology," NSF 2003-2007 (\$330,000)

## **PROFESSIONAL SERVICE CONTRIBUTIONS**

Founding Editor, *The Engineering Studies Series*, MIT Press  
Founding Editor, *The Global Engineering Series*, Morgan & Claypool Publishers  
Founding Co-Editor, *Engineering Studies: Journal of the International Network for Engineering Studies*, Routledge/Taylor & Francis  
Founder, International Network for Engineering Studies (INES) (2004-present)  
Chair, Liberal Education Division, American Society for Engineering Education (2009-2010)  
Elected Council Member, Society for Social Studies of Science (2003-2006)  
Advanced Study Member, Carnegie Foundation for the Advancement of Teaching (2002-2006)  
Invited Member, Action Forum for Diversity in the Engineering Workforce, National Academy of Engineering (1999-2002)

## VI. LETTERS OF SUPPORT (EXCERPTED)

### ***Lee Shulman, President, Carnegie Foundation for the Advancement of Teaching***

[Dr. Downey's] research on how engineering is understood and taught in a variety of different countries provided a unique lens on what is often called "problem-based" learning. He seamlessly combines technical with liberal education.

Downey's most startling idea is that students can become more effective engineers in practice by learning to listen and make sense of views that are different from their own regarding the problem at hand. By exposing engineering students to various national variations on "engineering culture," Downey has devised ways to make cross-national and cross-cultural comparison—one of the shibboleths of our global civilization—effective pedagogical experiences in the engineering classroom. . . . As a result, Gary's work [is] featured in the Foundation's report, *Educating Engineers*, which is part of our book series with Jossey-Bass, Inc., on professional education.

In sum, Gary Downey has shown a rare pedagogical imagination, but imagination that has been followed through with resourceful implementation. His publications, as well as his work in the Carnegie Foundation seminar, . . . make significant contributions to the scholarship and to the practice of engineering education.

### ***Michael Alley, Associate Professor, Engineering Education, Penn State***

Gary Downey has emerged as the national leader in an important area of engineering education: preparing our engineering students to work with engineers from other countries. In such a broad and open-ended research area, Downey has created an original and illuminating lens that focuses on how engineers in different countries are educated and how they solve problems. . . . As respected a scholar as Downey is on the national level, he is equally regarded for his selfless service. For instance, in the past few years, Downey has energized the Liberal Education Division of the American Society of Engineering Educators (ASEE). As program chair and then as president, he brought in new researchers, introduced engaging formats for conference sessions, given and organized excellent plenary talks, and swelled our ranks. In essence, Downey is high quality researcher whose publications, lectures, and service are having a deep effect on engineering education in the United States.

### ***Chyuan-Yuan Wu, Director, Institute of Sociology and Center for Science, Technology & Society, National Tsing Hua University, Taiwan***

Professor Downey is an internationally renowned scholar in East Asia. . . . I got to know him through many of his pioneering books and articles in technology studies and cultural studies of science, technology and medicine, especially his remarkable ethnography of engineering education. We invited Professor Downey to give a series of lectures on Engineering Cultures, funded by our National Science Council and K. T. Li Foundation for the Development of Science Technology, two of the most prestige funding agencies in Taiwan. The three lectures . . . drew an audience of more than 400 concerned scholars and students of various intellectual backgrounds from engineering to humanities and social sciences. While Virginia Tech has helped educated many Taiwanese talented students in the past, I believe no other event has ever imprinted, in so profound manner, the name of VPI in the minds of our intellectual community. . . [T]hrough his powerful speeches, Gary has inspired our local audience to rethink the reform of engineering education in historical and global perspectives.

### ***Gary Gabriele, Dean, College of Engineering Villanova University***

I believe Gary to be one of the foremost researchers and writers on engineering education today, and is truly deserving of this honor. I have provided copies of Gary[s] . . . paper ["The Globally Competent Engineer"] that appeared this last April in the *Journal of Engineering Education* to all our departments as a means of educating our faculty on this issue. The work is

so complete and well documented, and provides an excellent starting point for any department trying to determine the best means to provide students with a global awareness. . . .

The paper, "Are Engineers Losing Control of Technology?" in my opinion, is one of the most important papers on engineering education that I have read in the last five years. . . . Whenever I have shared this paper with anyone, and it has been often, the readers have the same reaction.

***Doris Zallen, Professor of Science and Technology in Society, Virginia Tech and winner, 2007 SCHEV Outstanding Faculty Award***

Each semester, many students report how life-changing has been their educational experience in his classroom and they marvel at their newly gained skills in elaborating strategies for solving problems when confronted by situations in which (they now recognize) there are differences in the way problems are being defined. Beyond the classroom, Downey mentors the graduate students who assist him in the Engineering Cultures course with such care that graduate students regard their education as incomplete if they have not been fortunate enough to have been assigned to work with him

***Dave Wisler, Manager, GE Aviation; US National Academy of Engineering; Sr. Vice President, American Society for Engineering Education***

Over my 37-year career at GE I have seen a great transition to what is now commonly referred to as "globalization." Unfortunately too few engineers and almost no recently graduated engineers really get what we are trying to accomplish. Even we didn't get it when we first started over a decade ago. Our process was to go overseas for reduced cost, train them to do it like we do it and reap the revenue rewards. Well, it didn't work - and your paper . . . nails why. We now better understand the concept of "working with people who define problems . . . differently". I wish new engineering graduates would understand this better.

***Les Gerhardt, Professor, Electrical, Computer, & Systems Engineering, Rensselaer and Senior Adviser, Institute for International Education***

I have known of Prof. Gary Downey's work for some time and have thought very highly of it. In the last few years that I have had the opportunity to really get to know him and gain a more personal perspective regarding his true quality, talent for leadership and inter-personnel skills. He has the unique ability to bringing out the best in people. . . . [He invited me] to participate in the Global Engineer's Workshop held in September 2008 at the National Academy of Engineering, which he organized and chaired. The effectiveness of that meeting and Gary's strong yet subtle leadership gave meaning to many implicit and explicit events in my own career and life, which I had never properly evaluated as to their meaning and impact to the subject at hand. In Gary, here was a person who had the observation skills coupled with his educational specialization to be able to interpret and analyze another person better than [he/she] was able to accomplish. I remain indebted to him for his insights, evaluations, and judgment. I also watched as he did the very same thing for several others of us so identified.

He is highly skilled in extracting the 'Gestalt' of an issue, of a person's accomplishment, and of leading others integrating their efforts towards a common goal for the future. He is both a source of light in guiding others, and of enlightenment on key issues important to our society, culture, and world. I strongly endorse Gary Downey for this prestigious award. . . . The quality he represents is certain to also serve to be a credit to the meaning of the Award itself.

***Ellsworth Fuhrman, Professor and Chair, Department of Science and Technology in Society***

Dr. Downey may be the first Virginia Tech faculty member to have his work guide a curricular study from the Carnegie Foundation for the Advancement of Teaching. The report, *A Life of the Mind for Practice: Engagement and Practical Reason as Goals of Higher Education*, devotes ten pages to highlighting Dr. Downey's views and efforts. The National Academy of Engineering first acknowledged the creativity of his work by awarding him a senior fellowship in 2005 and then

asking him to stay on for two additional years. The Engineering Directorate at the National Science Foundation values his work so highly that in 2006 a program officer telephoned and invited a proposal for a \$200,000 grant on a topic of his choice, which was subsequently awarded.

***Norman Fortenberry, Director, National Academy of Engineering's Center for the Advancement of Scholarship on Engineering Education***

Prof. Downey has contributed significantly to the efforts of the National Academy of Engineering to enhance the quality and research-base of educational activities. These contributions were made to both the Forum on Diversity in the Engineering workforce and the Center for the Advancement of Scholarship on Engineering Education . . . . Dr. Downey was a co-recipient of an NAE Boeing Engineering Education Senior Fellowship, one of only two non-engineering faculty members selected for this distinction. . . . Dr. Downey's contributions to engineering education stand out in two ways. First, he has contributed to a better understanding of national variations in the roles and views of work of engineers. This understanding is critical as we seek to educate engineers with globally competitive knowledge and skills. Second, he has directly contributed to the application of this knowledge by implementing the "Engineering Cultures" course . . . and extending the course's insight on the importance of working with others to address challenges of diversity and leadership. This translation of research into improved practice has provided a solid model for emulation by the engineering education community.

***Thomas Carter, Senior Manager, Michelin Americas Research Center***

I am leading the North American portion of an international process re-design effort targeting our actual research, development, and industrialization process. . . . For the design transformation effort, we asked Dr. Downey to consult with the North American Team. We reviewed Dr. Downey's video lectures on French Engineering Cultures. Afterwards, we met in person with Dr. Downey for face-to-face consultation. . . . As interesting and informative as [most] "cultural" instruction [about France is], it does not broach the important topics of the engineering and traditional educational systems in which my French colleagues have been steeped. By reviewing the lectures and consulting with Dr. Downey, our team has benefited by gaining an understanding of how the French are educated, how their society esteems their profession, and how they attack an engineering problem. It doesn't take us long to see the French approach to a meal, but understanding their approach to designing a process, and contrasting it to our approach takes some real study. . . . If every one of our undergraduate and graduate engineers had an appreciation of the cultural context of their colleague's education, it would be highly beneficial in our ability to transform our process.

***Charles Reinholtz, Alumni Distinguished Professor of Mechanical Engineering, Virginia Tech***

Few faculty members outside the College of Engineering are able to relate to the intricacies of teaching engineering design. . . . Gary has captured the respect, interest, and imagination of our engineering students like few others, within or outside the College of Engineering. I have also had an opportunity to observe and work with Gary on an issue related to the campus climate for embracing diversity and equal opportunity. Gary impressed me with his courage and passion regarding these issues. I believe his [efforts] had a significant impact at the highest levels of the University. . . . Gary is a gifted and popular teacher. His teaching, research, and social contributions to this University transcend the boundaries of departments and colleges.

***Hayden Griffin, Head, Department of Engineering Education, Virginia Tech***

Gary's knowledge of engineering and the critical thinking and analysis skills developed by his work in the humanities makes him a very powerful agent of change at a time when radical change in engineering curricula is critical to the very future of our country.

## VII. ADDITIONAL DOCUMENTATION

Following is a sample of written assessments from undergraduate and graduate students received by or written on behalf of Dr. Downey

***Abe Gillespie, former Engineering Cultures student***

I can honestly say that Mr. Downey has changed my life. . . . [T]hough it is a small change in perception, it is a necessary and positive change that Mr. Downey has afforded me via Engineering Cultures. In Mr. Downey's class we discussed what it means to pull a "Sununu" and how ignorant and uncompassionate "Sununuism" is. This is precisely how I responded to social situations. If people did not see things my way, then they were simply wrong. I never gave people the chance to state their opinion and if they did I would not listen. I like to think that this is quite the opposite of how I now react. I was taught that trying to at least understand someone's background/upbringing produces a much more meaningful and deeper relationship with that person. Doing so opens doors to other views and alternative ways to think. It breeds a more comfortable and accepting atmosphere. If nothing else, it allows me to be more fun to hang out with.

I hope that Mr. Downey has many more influential years teaching Engineering Cultures and connecting with kids like me.

***Sam Stone, former Engineering Cultures student***

Throughout the semester, Gary developed a strategy for applying the methodologies of engineering to non-technical problems that arise in technical and non-technical settings. By applying the [Location, Knowledge, Desire] strategy to my own circumstances, I was able to identify aspects of the engineering profession that appealed to me, as well as aspects that discouraged me. Having identified the sources of my discontent, it was much easier for me to choose a career path that enabled me to practice engineering and serve society. Furthermore, while the problem-solving-with-people strategy was invaluable in my career planning, the strategy is also helpful on a more routine basis. I have been a much better team member since taking Gary's course. In the past, I tended to be obstinate in presenting and advocating my own designs, to the extent that my teammates and I often became frustrated with one another. Now I am more willing to listen to my teammates, to discuss their ideas, and to seek a high-quality design that incorporates the best ideas of all team members. As a consequence, I feel less tension on my teams, and I find that my teammates are willing to work much harder on our projects, because they know that they have contributed their own ideas to the design.

***Arshia Cont, former Engineering Cultures student***

I graduated from EE and Math from VT last spring. In my last semester I took Engineering Cultures and honestly, it has been one of the most useful courses I have ever had in my engineering curriculum and I talk and reflect on it very frequently. After my graduation I came to Paris (by accident!) to do an interdisciplinary Masters in Acoustics, Signal Processing and Computer Science applied in Music at IRCAM. If you remember me I was your Iranian student . . . I thought maybe by being here, I could be of some use to your research or teaching as a volunteer since it interests me a lot. I thought maybe I can make things clearer for your students in a chat session about France or anything else. Or else, I wanted to let you know of the precious value I consider for what I learned from your course. Let me know if I can be of any help.

***Brent Jesiek, Assistant Professor of Engineering Education, Purdue University***

From my first weeks on campus as a nervous teaching assistant to my more recent experiences on the academic job market, Gary has proved a patient and caring mentor, always generous with his time and known for imparting excellent advice. . . .

As a teacher, I have been greatly inspired by Gary's ability to engage undergraduate audiences,

articulate and meet well-defined learning objectives, and maintain high academic standards. In fact, my involvement with a series of course development and assessment projects spearheaded by Gary has helped impressed upon me the importance of pursuing the scholarship of teaching and learning as a part of my own career.

In graduate courses, . . . I have both witnessed and benefited from Gary's impressive ability to encourage all students to have an active voice in the classroom and to passionately pursue their research interests. His graduate seminars have a reputation for being well structured, intellectually stimulating, and highly conducive to the formation of active and engaged learning communities. . . .

Gary has mentored me in many other ways. . . . Looking forward, I fully intend to follow Gary's model by supporting my future students and colleagues in as many ways as I am able

***Sharon Ruff, STS Ph.D. candidate, Virginia Tech***

I will try to capture just a few of the ways Dr. Downey has provided me with outstanding mentorship and support. . . . [He] has consistently gone out of his way to invest in my development – professional, academic, and pedagogical – in ways that have gone above and beyond the role of my academic advisor.

[The] Research in Engineering Studies . . . group has [involved] local researchers from a variety of departments and has fostered an engaging dialogue among junior and senior scholars. Discussing my research with the group has fostered my development both professionally and academically.

One of the ways Dr. Downey encourages my research is by challenging me to investigate the resources in other departments such as Engineering Education and Women's Studies. These connections have greatly increased my academic repertoire and have strengthened my capacity for contribution as an STS scholar. Additionally, Dr. Downey has . . . afforded many graduate students, including myself, an opportunity to participate in research and co-author with him . . . .

The NSF funded workshop . . . afforded me the opportunity to intimately engage with scholars from around the world from a variety of disciplines who yet share a commitment to Engineering Studies.

***Juan Lucena, Associate Professor, Liberal and International Studies, Colorado School of Mines***

From my first interactions with Professor Downey in the early 1990s, I learned from him a strong devotion to . . . teaching, respect for students as persons with dreams and aspirations that need to be nurtured and empowered, and the arts of scholarly writing, grantsmanship, and curriculum development. [In writing grant proposals], he showed me the importance of 'reading your audience,' seamlessly integrating proposal narrative, methods and budget, and demonstrating the value of your research to taxpayers. These lessons have translated into a successful record of external funding. . . . It has been a pleasure reflecting back on all the important lessons I have received, and continue to receive, from Professor Downey.

## **Selected Student Comments from Course Evaluation Forms**

### *STS 2054 Engineering Cultures*

I have definitely learned more about engineering as well as about myself in this course than any other course.

I found the class to be very informative about other cultures and engineers in the world. Dr. Downey was an excellent professor who made an attempt to know everyone in the class, something most professors do not even care about.

Great class that taught me a lot about engineering in different cultures. I have gained a better understanding of how I can impact society in a positive way through engineering.

[This class] really teaches me to step outside of myself and assess different perspectives. Professor is very interested/involved in the material, which makes learning so much better.

This was one of the best classes I've taken. I came in not looking forward to another class related to engineering, but found it to be very interesting. I especially enjoyed the time spent looking at the cultures and historical development of different countries.

Course gives students excellent understanding of how engineering is perceived and conducted in US and countries abroad.

Great course!! It has helped me learn a lot about the engineering profession and what I need to supplement my engineering education.

This class really improved my listening and people skills.

Dr. Downey does well in treating students as individuals in such a large class.

Excellent and interesting course. Should be required for all engineers.

Note: here's an example of the sort of learning challenge Dr. Downey faces daily:

"I like Gary. He's a very nice guy and probably a good professor. I simply did not enjoy the course. Too much reading and too much emphasis on opinions and views for me. I'm your typical engineer--logical thinking and problem solving, black and white.'

### *STS 1504 Introduction to Humanities, Science and Technology*

I really enjoyed this class. I never knew I could be so interested in a social subject. Gary made me want to do my best. That's important.

Excellent teacher, one of the best I have ever had!!! Concerned about each and every student Makes class very interesting. I have learned more about social issues in this class. I have a new way of looking at the world around me. One of the most intelligent teachers I have ever had. He is an example of the "perfect" teacher.

### *STS 6532 Cultural Studies of Science, Technology, and Medicine*

This is an excellent course, bringing together intellectually stimulating ideas and theories in the contemporary study of science. Dr. Downey brings theoretically sophisticated, yet practical and realistic, perspective to this course that I learned much from.

The ratings given to this instructor as well as the class are not an exaggeration. I thoroughly enjoyed and benefitted from the readings. I learned a lot.

I learned a lot from this course. It pushed me to think about the ways other areas of study contribute to our understandings of technoscience and the relationship between academic theorizing and popular theorizing. Gary himself is a super human being. Thank you Gary for being my teacher and my guidance.

**Dr. Downey led the founding of the new journal *Engineering Studies: Journal of the International Network for Engineering Studies*, which he now co-edits. He built a distinguished editorial board of 30 members from 14 countries. He wrote its vision and mission statements and built a review process that insures high quality publications.**



*Engineering Studies* is an interdisciplinary, international journal devoted to the scholarly study of engineers and engineering. Its mission is threefold:

1. to advance research in historical, social, cultural, political, philosophical, rhetorical, and organizational studies of engineers and engineering;
2. to help build and serve diverse communities of researchers interested in engineering studies;
3. to link scholarly work in engineering studies with broader discussions and debates about engineering education, research, practice, policy, and representation.

*Engineering Studies* is published three times yearly by Routledge, an imprint of the Taylor & Francis Group.

#### Vision Statement

The field of engineering studies is a diverse, interdisciplinary arena of scholarly research built around the question: What are the relationships among the technical and the nontechnical dimensions of engineering practices, and how do these relationships change over time and from place to place? Addressing and responding to this question can sometimes involve researchers as critical participants in the practices they study, including, for example, engineering formation, engineering work, engineering design, equity in engineering (gender, racial, ethnic, class, geopolitical), and engineering service to society.

Engineering Studies juxtaposes contributions from distinct disciplinary and analytical perspectives to encourage authors and readers to look beyond familiar theoretical, topical, temporal, and geographical boundaries for insight and guidance. The diversity in the editorial staff and board is designed to map the diversity in the field and support its persistence. While prospective authors are invited to reflect on and anticipate how their work might prove helpful to others elsewhere, both within the academy and beyond, they can also feel comfortable imagining familiar audiences and producing familiar modes of analysis and interpretation. The heterogeneity of perspectives in engineering studies is its lifeblood, and the goal is high quality scholarship in every case.

Recent and Forthcoming Theme Issues: *Engineers, Engineering and Social Justice*; *Engineers in the Armed Forces*; *Engineers in the 18th Century*; *Engineers in the Workplace*; *Engineers and Communication*

**Dr. Downey has founded and edits two new book series in Engineering Studies.**

**The MIT Press *Engineering Studies Series* serves as the intellectual capstone for the field.**

**The Morgan & Claypool *Global Engineering* series produces short books for student use, using an electronic platform with free downloads through university libraries.**

