

**NOMINATION COVER SHEET**  
**2016 Virginia Outstanding Faculty Awards**

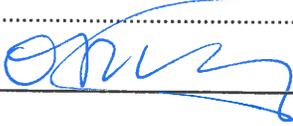
<b>1. <u>NAME</u></b> Full (Legal): Michael F. Hochella, Jr.                      Preferred First Name: Mike	
<b>2. <u>INSTITUTIONAL INFORMATION</u></b>  Institution: Virginia Tech  Rank/Position Title: Univ. Distinguished Prof.  Year Rank/Title Attained: 2007  Years at Institution: 23  Campus Email Address: hochella@vt.edu  Campus Phone: 540-231-6227  Campus Mailing Address: 4044 Derring Hall, Dept. of Geosciences, Blacksburg, VA 24061  Campus Communications Contact:  -Name: Tracy Vosburgh -E-mail: tracyv@vt.edu	<b>3. <u>PROFESSIONAL INFORMATION</u></b>  Academic Discipline: Earth sciences, geoscience  Specialization/Field: Environmental chemistry  Type of Terminal Degree: Ph.D.  Year Awarded: 1981  Awarding Institution: Stanford
<b>4. <u>PERSONAL INFORMATION</u></b>	

***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: Thanassis Rikakis  
 E-mail address: provost@vt.edu                      Telephone: 540-231-6123

## **EXCERPT FROM VIRGINIA TECH'S 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 discovery, and outreach and engagement, 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.

## SUMMARY OF ACCOMPLISHMENTS

### ***Abstract of all areas of accomplishment***

Michael F. Hochella, Jr. is a University Distinguished Professor at Virginia Tech (Blacksburg, Virginia, USA), concentrating in the area of environmental science on local, regional, and global levels. He is one of two “fathers” of nano-geoscience, a brand new field in the Earth sciences that is designed to investigate and understand the fundamental and practical importance of how naturally occurring nano-materials on Earth affect how the world’s oceans, atmosphere, soils, rocks, and biological components behave. Beginning especially in the early 1990’s, this field was invented by Hochella and Dr. Jill Banfield at the University of California at Berkeley. Hochella is also thought to be one of the finest researchers ever in a field of geochemistry called “mineral surface geochemistry,” an important fundamental field of geochemistry in which the critical atomic and molecular interactions between the Earth’s minerals and the rest of the planet (water, air, soil, living things) take place.

Hochella received his B.S. and M.S. from Virginia Tech in 1975 and 1977, respectively, and his Ph.D. from Stanford University in 1981. He has been a professor, first at Stanford, and then at Virginia Tech, for a total of 26 years. He has been a Fulbright Scholar, has won the Humboldt Award, the Brindley Lecture Award, the Dana Medal, and the Virginia Scientist of the Year Award. He has been elected as a Fellow of nine international scientific societies/ organizations including the American Association of the Advancement of Science and the American Geophysical Union. He has held the Presidencies of both the Geochemical Society and the Mineralogical Society of America, both international scientific societies. He has also won the Distinguished Service Medal of the Geochemical Society. He has served on high-level advisory boards to the National Science Foundation and the U.S. Department of Energy. He has a total of 201 professional publications, and has been cited over 9,400 times in the professional literature (source: Google Scholar) currently increasing by over 850 new citations per year. He has been hosted for giving lectures and workshops in 43 of the 50 states in the U.S. and in five Canadian provinces, and he has also been invited to 15 other countries around the world (Europe, Far East, Middle East, and Africa) as an environmental scholar and speaker. He has raised well over \$22.5 million in research funding.

Hochella has taught for 33 years at Stanford and Virginia Tech, teaching a total of 10 different courses from introductory freshman classes to advanced classes for Ph.D. students. His average overall teacher rating from students over the years is 3.85 on a 4.00 scale. He has developed brand new courses and also new curricula at the high school, undergraduate and graduate levels. He has also closely advised and mentored over 100 students, each for multiple years, to move them towards the specific careers of their choice. For the graduate students and post-docs for whom he has been the principal advisor, 22 of them are now professors at universities in five countries, while many others hold prominent positions in national laboratories, industry, and scientific publishing.

### ***Teaching***

It is likely a combination of Hochella’s natural gifts as a teacher as well as the deep insight he has gained from teaching and learning experts over several decades that makes him such an effective, respected, and loved instructor. The following student comments are representative of many hundreds of equivalent comments that he has received over the years. These particular comments come from two nanoscience classes taught in the last two years, with freshmen through seniors enrolled, and 40 to 50 students in each class (more comments can be found in the supplemental section, along with evaluation statistics):

- “Let me start off with the fact that Professor Hochella is a genius professor. This class has changed my life from my future dream career to how I perceive the world, wide-eyed and eager to learn. I am aware that this is just an intro class and nanoscience gets much more difficult and some parts even monotonous and boring but Mike took this class of

simple, basic nanoscience and opened it up to infinite possibilities. Instead of just teaching the basics of nanoscience, Mike taught us WHAT WE COULD DO with it and HOW IT EFFECTED THE WORLD. I have had many, many intro classes as an engineer and not one has laid out the end game; what we are doing and why we are doing it. Every day I walked out of Mike's classroom with a sense of awe, purpose, and motivation. Take the best rating of anything you've ever had, multiply it by a factor of 10: That is what I am trying to express about this class."

- "Incredibly respectful and kind. It blew me away how experienced and full of knowledge Dr. Mike is...and yet he enjoys teaching freshmen in an introductory class! I felt so special."
- "Mike is an awesome professor and I wish he taught all of my classes. The style he teaches in is very understandable and he makes the more difficult topics easy. He also has his students best interests in mind and is very conscious of the heavy workload in college as a science major. Mike's main goal was to make sure we understood a small bit of material very well instead of making sure we covered a ton of material that the students kind of learned."
- "He is probably the most respectful professor I've experienced in my four years here at Tech. He treats you like a human being and not like a subordinate and gives you every opportunity to succeed. If you don't get an A or B in this class you're really not trying."

#### Stanford teaching years, 1983 – 1992:

During these first years of Hochella's teaching career, he was responsible for two courses both taught at the graduate student level. They were entitled "Surface Science" and "Electron- and X-ray- Analytical Methods." These classes, consisting of 10 to 30 students, were taught to physicists, chemists, materials scientists, and geoscientists.

#### Virginia Tech teaching years, 1992 – present:

Over the last 23 years, Hochella has taught classes from the freshman to advanced graduate student levels. He has completely reformulated the existing courses "Elements of Geology," "Resources Geology," and "Mineralogy and Crystallography." He has created new undergraduate courses entitled "Introduction to Nanoscience" and "Professional Dissemination of Nanoscience Research," and a new graduate course entitled "Surface Science and Interface Behavior." Hochella also led the seven-year effort to create an entirely new (and unique in the world) high school curriculum in environmental nanoscience and technology. Finally, he was a key member of a team to create a new graduate course entitled "Interdisciplinary Research in Science and Engineering."

#### Hochella's methods to make course revamps and new courses a success for students:

- All classes are student-centered and have active-learning environments. Hochella acts as the catalyst, coach, and friend. Students love this format, and feel empowered by it.
- Barriers are completely removed. Titles are dropped, formality is out, sleeves are rolled up, and flexibility is always available (with the sole intent of fitting the learning style and learning rate of each student).
- Everything taught/everything learned is completely relevant to the modern world and the interests/needs/desires of the students in their generation, not Hochella's.
- Difficult scientific concepts (and there are many!) are each dismantled into easily understandable component parts using everyday analogies, then carefully reassembled into glorious patterns that nearly *everyone* understands.

#### Measures of success of Hochella's revised and new classes:

There are three clear indicators of the success of these classes, including –

- *Class attendance.* Hochella tells students that class attendance is not required. Roll is never taken, and students can never be penalized for not coming to class on non-testing days. Even in classes of 200 students, attendance typically remains above 80%. In smaller classes (30-50 students), attendance rarely falls below 90%, and is often 95%. Students want to come to class (according to their written evaluations) because they find it interesting, relevant, understandable, and rewarding.
- *Average class grade.* The great majority of grades in Hochella's classes are A's and B's, but **not** because of grade inflation or "easy" tests. Test difficulty, if anything, has gone **up** over the years. But students are doing better because Hochella prepares each student very well through tutoring sessions, practice problems and tests, and effective and clear instruction that students at all talent levels can follow. Therefore, average class grades have improved because more students are learning the material better, which is the goal.
- *Student evaluations.* Nearly all student evaluation scores for all aspects of Hochella's courses are between 3.7 and 4.0 (on a 4.0 scale), and the overall student rating of the course is also between 3.7 and 4.0, averaging about 3.85 (see table in the Additional Documentation section). And this is with evaluation response rates typically better than 90%. Student written evaluations are overwhelmingly and exceptionally positive. Still, Hochella encourages the students to write critical comments, and several excellent ideas have been received from students over the years. These adjustments help keep the class atmosphere fresh and modern, and empower the students to have a stake in the class.

### **Discovery**

Hochella is an explorer. As a hiker, he has covered well over 1,000 miles of little-used backcountry trails in Montana, California, and Arizona (and lesser distances in other states) since he was 16 years old. At 61, he is still hiking. As a private pilot since he was 23 years old, he has flown for many hundreds of hours over remote areas in Montana and California, observing and taking photographs of geologic and environmental features. Again, at 61, he is still flying. He uses this same exploring spirit in his science. He only explores areas of science where few, if any, have ventured before. In time, many other scientists will join to do research in these areas, and this is his signal to move on to find the next unexplored frontier.

In part due to his tendency to open up new areas of geo- and environmental science, Hochella's scholarly publications are highly cited. He has three papers with 300 or more citations, 8 papers with 200 or more citations, and 31 papers with 100 or more citations, with many more to come in the future. In the fields in which he does research, this many papers with this many citations is considered extraordinary because the number of scientists in these fields is much smaller than in more populated scientific areas like chemistry, physics, medicine, and engineering. Even in these fields just mentioned, Hochella's citation rate (over 850 new citations per year) is considered to be very high.

Hochella also publishes in the journal *Science*, one of the top two scientific journals in all fields of science in the world, the other being the journal *Nature*. It is very unusual for any Earth scientist to have published in *Science* four times, and Hochella will submit a fifth paper shortly which shares his discovery of an environmentally vital, previously unknown mineral that forms in the coal-burning process in power plants around the world.

#### Hochella's most influential papers in the scientific literature:

Below, Hochella's six most cited published papers that have drawn world-wide attention are listed, with a very brief descriptor for each paper, and the paper's title and authorship:

1) Published in 2001 with 349 citations to date, this paper by the Hochella research group was the first in the world to describe how an atomic force microscope can be used to measure the

minute forces between bacteria and minerals. This work explains the transport of dangerous bacteria in the environment and the spread of bacterial diseases in humans.

Lower S., Hochella M., and Beveridge T. (2001) Bacterial recognition of mineral surfaces: Nanoscale interactions between *Shewanella* and  $\alpha$ -FeOOH. *Science*, 292, 1360-1363.

2) Published in 1991 with 315 citations to date, this paper by the Hochella research group was the first in the world to determine the atomic structure of the surface of calcite, the mineral that forms limestone.

Stipp S. and Hochella M.F., Jr. (1991) Structure and bonding environments at the calcite surface as observed with X-ray photoelectron spectroscopy (XPS) and low energy electron diffraction (LEED). *Geochimica et Cosmochimica Acta*, 55, 1723-1736.

3) Published in 2008 with 313 citations to date, this paper by a Hochella-led team of scientists formally defines the new field of research called "Nanogeoscience," the field of science that Hochella pioneered.

Hochella M.F., Jr., Lower S.K., Maurice P.A., Penn R.L., Sahai N., Sparks D.L., Twining B.S. (2008) Nanominerals, mineral nanoparticles, and Earth systems. *Science*, 319, 1631-1635.

4) Published in 1993 with 298 citations, this paper from the Hochella research group was the first in the world to explain the reasons why certain chemicals block the growth of one of Earth's vital minerals, calcite.

Dove P.M. and Hochella M.F., Jr. (1993) Calcite precipitation mechanisms and inhibition by orthophosphate: In situ observations by scanning force microscopy. *Geochimica et Cosmochimica Acta*, 57, 705-714.

5) Published in 2010 already with 255 citations, this paper from the Hochella research group reported the discovery of the formation of silver sulfide nano-particles in domestic and industrial waste water, and in agricultural soils. This discovery has critical environmental impact.

Kim B., Park C., Murayama M., and Hochella M.F., Jr. (2010) Discovery and characterization of silver sulfide nanoparticles in final sewage sludge products. *Environmental Science and Technology*, 44, 7509-7514.

#### Hochella creates and directs a new National Center, starting October 2015:

Over the last four years, Hochella has worked alone, yet passionately and tenaciously, to create a completely new and innovative national nanoscience and technology discovery center for all Earth and environmental scientists and engineers. In interviews and talks, Hochella has made it clear that this is the greatest discovery activity of his career, in that this new national center will open the floodgates to nano-geo and nano-environmental scientists and engineers not only for his groups and all of Virginia Tech, but for colleges, universities, and businesses across the Commonwealth, and indeed across the United States. Hochella learned this summer that the National Science Foundation has accepted his proposal to do just this, and the funding will be in place by October 1, 2015. This multi-million dollar contract (5-years, with the opportunity to renew for 5 more years) is in addition to a \$20+ million investment that has already been made in equipment, space, and staff. Yet it is this new NSF contract, brought in by Hochella, that was necessary to officially establish and operate what is now, formally, the Virginia Tech National Center for Earth and Environmental Nanotechnology Infrastructure (VT NCE<sup>2</sup>NI). VT NCE<sup>2</sup>NI allows their extensive nano-research facilities, and their world-class staff, with more to be hired, to be available to all scientists and engineers who can use instruments and facilities with in-house experts for their research. The Center occupies over 21,000 square feet of space. Hochella also funded a significant program to bring in up to 30 African American and Latino undergraduate- and graduate-level scientists and engineers each year, completely

free of charge (including transportation and housing), to work on their research facilitated by VT NCE<sup>2</sup>NI staff and equipment.

### ***Knowledge integration***

Hochella has been involved in curricular development during each of the 32 years of his professional academic career. He has also always been deft at placing his expertise in surface and interface science, and in nano-biogeochemistry science, into larger interdisciplinary and cross-disciplinary contexts. Both of these “knowledge integration” tools have clearly been a vital key to the success he has found in his career. Listed and briefly described below are what Hochella feels are the two most important curricular development projects that he has ever led or co-led, both of which are also fantastic examples of bringing discovery elements of his career into teaching over multiple levels (in these cases, high school and undergraduate levels).

Hochella leads the “Nano2Earth” project, a high school curriculum distributed and sold under the name “*Welcome to Nanoscience*”:

Hochella’s Nano2Earth Project (pronounced “nano-to-Earth,” and funded by the National Science Foundation) is a nanoscience curriculum written for secondary schools. After many years of conception (starting in 2001), development, testing, rewriting, and marketing, it is now a major 171-page high school environmental nanoscience curriculum that has been adopted and sold, since 2012, by the National Science Teachers Association (NSTA, the largest organization of science teachers in the world). The first book of its kind, it has sold very well, and as far as we know, is used in whole or in part by many hundreds of high schools across the country.

The full title is “*Welcome to Nanoscience: Interdisciplinary Environmental Explorations, Grades 9–12*,” which explains much more about its intent. This book/curriculum brings nanoscale science and technology to life in the context of the Earth and environmental sciences. Nanoscale science and technology, working with environmental science issues, transcends traditional scientific knowledge and processes presented in high school chemistry, biology, physics, geoscience, and environmental science classes today. In addition, every aspect of the curriculum addresses one or more of the National Science Education Standards.

Hochella plays key role in developing a new undergraduate major at Virginia Tech:

Under the leadership of Dean Lay Nam Chang (College of Science), Hochella has played a central role in creating, developing, and growing one of the newest majors at Virginia Tech, the B.S. degree program in Nanoscience (<http://www.science.vt.edu/ais/nano/>). Hochella made the very first case at Virginia Tech for the establishment of the “School of Nano-Science and Engineering” in 2004. Over the decade that has followed since that time and under the outstanding leadership of former Physics Department Head Beate Schmittmann and now Associate Dean and Nanoscience Program Leader Randy Heflin, Hochella has been the senior statesman for this program and central to its development. He was a central figure in getting the new major approved by the State Council of Higher Education for Virginia (SCHEV), and created and has taught three courses in the curriculum’s core. These courses include the all-important gateway course into the major, *Introduction to Nanoscience*, where he brings to life the extraordinary breath of this science, fully relevant to the broad fields of physics, chemistry, biology, and geoscience. He taught this class for the first time four years ago to 12 students. This year, he will teach it to 72, the majority of which are new majors and minors.

The first class of B.S. Nanoscience majors graduated this past spring (2015). Finally, although several universities offer minors or tracks in nanoscience, only one other (the State University of New York at Albany) offers a full nanoscience undergraduate program at this time.

### ***Service***

Service may be the most time-consuming portion of Hochella’s career, as he is constantly called to serve at local, regional, national, and international levels. Due to time

pressures, he is more likely to turn down a new research request rather than a new service request. This is because he is constantly looking for ways to give back as he tries to make up for all that he has received for which he is deeply grateful. Examples of this “giving back” over the decades go to those people/organizations in greatest need. Of the 30 major service commitments to which he has devoted much of his professional career, eight examples are listed below with a brief explanation:

- Founder and Director of the Virginia Tech National Center for Earth and Environmental Nanotechnology Infrastructure, 2015-future (funded through 2020, with possible extension to 2025): Hochella’s work in this area is described in the section on Discovery above.
- Founder and Director, Virginia Tech Center for Sustainable Nanotechnology, 2009-present: This is a Center within Virginia Tech’s Institute for Critical Technology and Applied Science that has raised over \$20M in science research funding since Hochella founded it in 2009.
- Chair, External Advisory Board, Delaware Environmental Institute (DENIN), University of Delaware, 2010-present: DENIN is an important and influential environmental institute (<http://denin.udel.edu/>) that focuses on grand challenges facing Delaware, the United States, and the world. DENIN’s non-political role is to inform “decision makers by providing the knowledge that helps create sound environmental policies.” Hochella has led DENIN’s distinguished External Advisory Board since its inception, which says something about the respect given to Hochella’s standing in the environmental community.
- Vice-President, President, and Past-President of the Mineralogical Society of America (MSA): This was a 3-year commitment from 2010 to 2013. MSA is the largest and most influential mineralogical scientific society in the world, with an endowment of several million dollars and a very large publishing enterprise. Hochella’s leadership resulted in building close, formal ties with the American Geophysical Union (AGU), a large boost for MSA since AGU is the most influential geoscience society in the world today.
- Member, Basic Energy Sciences Advisory Committee (BESAC), Dept. of Energy, 2007-2009; and Member, Advisory Committee for Geosciences (AC/GEO), National Science Foundation, 1999-2002: Membership in both BESAC and AC/GEO is exceptionally prestigious and rare. Both of these committees are at very high levels, each overseeing many hundreds of millions of dollars of federal research money on an annual basis.
- Board Member, Vice-President, President, and Past-President of The Geochemical Society: This was an eight-year commitment from 1996 through 2003. The Geochemical Society, the largest, oldest, and most influential society for geochemists in the world, was transformed under Hochella’s leadership in many ways, organizationally, administratively, financially, and in publishing. This resulted in his winning the Distinguished Service Medal of the Society, which was presented in 2007.
- Hochella has briefed the U.S. Senate Committee on Environment and Public Works, the U.S. General Accountability Office, the National Science Foundation, the U.S. Department of Energy, and Virginia State Senators on nanotechnology and the environment.
- Editorships, spanning 1983 to 2015: During this 33 year span, Hochella was an Associate Editor and Editor for 22 of those years with three major geoscience publications, *American Mineralogist*, *Geochemica et Cosmochemica Acta*, and *Elements*. For *Elements*, he was one of the three Founding Editors. It now has international distribution among well over 15,000 subscribers and thousands of libraries around the world. Finally, Hochella is now an Editorial Board member of a brand-new, very high profile journal, *Environmental Science: Nano*, which is published by the Royal Society of Chemistry in London, England.

## PERSONAL STATEMENT

In my entire professional academic career, now spanning 32 years following the awarding of my Ph.D. degree from Stanford and a short, unsatisfying stint in industry, I have only felt truly and deeply satisfied by always and forever attempting to do what I guess is generally not considered a good idea: to participate fully in all four areas of Boyer's scholarly endeavors as if they were inseparable as a super-remarkable, single task. I would learn later, and I even teach to undergraduates now, that this general concept (i.e., one thing that manifests itself in several seemingly disparate ways) is right out of the field of quantum mechanics. In that realm, we discover that one entity (e.g., light) can in fact happily and simultaneously exist in two or more distinct characters or states (both waves and particles, in this case). By no means was this a brilliant premeditated plan on my part. It is simply something that I do because without all four endeavors churning in me as one in a single, hopefully beautiful tapestry, I truly feel incomplete and forever unfinished as if I am not being responsible to my personal core values. I guess to me, as unrealistic as it would rightly seem to many others, teaching, discovery, knowledge integration, and service really are parts of the same thing, truly in the same time and space. This is very much the stuff of the foundation of quantum physics, and to me, very much the stuff of being an academic.

To explain where this innate behavior would or could have come from within me, it is necessary to go back to the turbulent years of my birth and rearing. To start, for better or worse, I seem to be a singular occurrence on both sides of my extended family of English (maternal) and Slovakia (paternal) immigrants. I was born in Japan in 1953 to American parents just as the Korean War was ending. My father was a military pilot and a true war hero, having been decorated with several of this country's highest military honors and medals for his bravery and leadership in the air wars that raged during WWII and the Korean War. To tell you the truth, it was a miracle he survived either conflict. The majority of his closest comrades did not. For this, in the years that followed, he was written about in books and magazines, and interviewed on TV, his stories of miraculously escaping death told over and over again especially in his later years. But what my dear father couldn't escape was a lifelong struggle with alcoholism, and what today would be described as bi-polar disorder, both likely the result of, or at least greatly exasperated by, his wartime experiences. As a result, I grew up in a deeply dysfunctional, torn, and at times frightening home. I had my own surviving to do, starting at a very young age. My mother, who was just doing her best to hang on but with problems of her own, thankfully had a "glass-half-full" personality that I inherited. I understand now that this inheritance was a vital saving grace; one of my two sisters was not as fortunate, and sadly she is no longer with us. For me, to even study each day after school, I had to shut out the world around me. And to compound this situation in my early years, I was slightly to moderately dyslexic along with a deficit in pattern recognition. I was overwhelmed in my earliest years in school, and I still read slowly. Before the days of computer spell checking, my dictionaries were completely worn. My spelling remains substandard. As a result of all this, it has taken me many years to obtain a "quiet" confidence in what I do for a living. Yet even today, I always know that I could and should do better.

So, what's the result of all this? Well, for whatever reasons, many people think that I have a special insight into the complexity of nature, and even how people and groups of people work, and they say that I'm an unusual and naturally gifted teacher. And although deeply appreciative, after being recognized in various ways by universities, fellow scientists, governors, senators, and a number of national and international scientific societies, to tell you the truth, I'm a bit embarrassed and wonder what all the fuss is about. To be perfectly honest, it never crossed my mind that Virginia Tech would nominate me as an Outstanding Faculty Award candidate, and it has not been easy for me to help put this package together, and especially to

write this essay. I read about the winners of this award practically every year, admiring the truly impressive and genuine accomplishments of my colleagues, without the need or even thought of being among them.

What I do most care about, and the driver of all that I do, really boils down to two things that meet my core needs. These are clearly and simply 1) my very strong sense of curiosity, and 2) a love of happy, healthy, and productive human relationships. The former is only due to a roll of the genetic dice in my particular brain from my particular parents. The latter, I believe, is an incredibly deeply ingrained environmental consequence of my growing-up years that would always provide the opposite human interaction dynamic that I experienced for decades in my own birth family. Core value 1 explains my love and joyful passion for science and technology. Certainly, deeply rooted curiosity gives all of us, if we so choose, the ability to not only be curious, but to quench this urge through discovery. Core value 2 explains my love of teaching and service. And both core values together explain my great attraction to knowledge integration and teaching. And to come full circle, this finally explains why Boyer's four scholarly endeavors neatly fold into a singularity in my brain, in that all four easily pack as one into my two foundational core values that make me, me.

As a consequence of the above, my teaching philosophy is very simple. I trust the vast communities of cognitive-based social and biological scientists that have analyzed, studied, and theorized within the academic fields of teaching and learning. I am not such a researcher, but I understand and admire the best that these remarkable practitioners can provide to me. I do my best to learn everything they have to offer, and to follow their developments carefully from decade to decade, and year to year. As a result, my effectiveness as a teacher has improved immeasurably.

My teaching is based on the latest student-centered learning models. My teaching is also based on the scientifically demonstrated premise that everyone learns in different ways and at different rates. Therefore, using both principles, I think of my classes as so many individuals, not as a group. In addition, to break down every conceivable barrier, I insist that they address me by my first name, and I am truly available to them. I have returned student e-mails at 2 a.m., and I have come in on Sundays to help students study for a test. I do not require students to come to class, but my attendance is nearly perfect because they want to be there. I treat everyone with thoughtfulness, kindness and respect. So much so, that I have had students come to me to confess that they have cheated. I have worked with students like this for months to pull them out of this highly destructive habit. This goes far beyond school; it changes life patterns.

And over the years, the grades in my classes have improved, not through grade inflation, but because students are learning in better ways for who they are individually. At the same time, my student ratings as a teacher have improved from very good to what I consider "too good to be true."

I'll end with another story about my father, who, despite his severe afflictions, loved me more than anything in the world. From about middle school on, he told me over and over again, "Son, always aim high, and don't be afraid to fail." I've always tried to live by that creed. And if I can succeed, others around me certainly can too. In my life, these "others" are my students, from freshmen to post-docs, and it is they who are our best and our brightest. If I can help them, one by one, and step-by-step, I have fulfilled my life's mission.

## ABBREVIATED CURRICULUM VITAE OF M.F. HOHELLA, JR.

Department of Geosciences and Institute for Critical Technology and Applied Science  
Virginia Tech, Blacksburg, VA 24061-0420

Group website: <http://www.geochem.geos.vt.edu/environano/welcome.html>

### Professional Preparation:

Virginia Tech	Geological Sciences	B.S., 1975
Virginia Tech	Geological Sciences	M.S., 1977
Stanford University	Earth Sciences	Ph.D., 1981

### Professional Employment:

• University Distinguished Professor	Virginia Tech	2007-permanent
• Professor	Virginia Tech	1996-2007
• Associate Professor	Virginia Tech	1992-1996
• Associate Professor (Research)	Stanford University	1989-1992
• Senior Research Associate	Stanford University	1983-1989
• Senior Scientist	Corning, Inc.	1981-1983

### Medals and Awards (9):

- George W. Brindley Award, Clay Mineral Society, 2008
- Distinguished Service Medal, The Geochemical Society, 2007
- University Distinguished Professor, 2007 (life award and position, only 1% of faculty at VT)
- Virginia Scientist of the Year, 2005
- Virginia Tech Alumni Award for Research Excellence, 2005
- DOE Outstanding Research Award for Geosciences, 2003
- Dana Medal, Mineralogical Society of America, 2002
- Alexander von Humboldt Award, 2001
- Senior Fulbright Scholar Award, 1998

### Presidencies (2):

- President, Mineralogical Society of America (2011-2012)
- President, The Geochemical Society (2000-2001)

### Fellowships (9):

- Fellow, Environmental Molecular Sciences Laboratory, US Dept. of Energy, 2015
- Fellow, Royal Society of Chemistry (United Kingdom), 2014
- Fellow, International Association of GeoChemistry, 2013
- Fellow, American Association for the Advancement of Science (AAAS), 2007
- Fellow, The Geochemical Society, 2007
- Fellow, European Association of Geochemistry, 2007
- Fellow, American Geophysical Union, 2006
- Fellow, Mineralogical Society of America, 1990
- Fellow, Geological Society of America, 1988

### University Teaching (includes 10 years at Stanford and 23 at Virginia Tech):

- Course subjects taught: Intro. to Environmental and Sustainability Science, Geology for Civil Engineers and Forestry Majors, Mineralogy and Crystallography, Surface Science (all levels), Nanoscience (all levels), Electron- and X-ray- Analytical Methods, Technical Speaking and Writing (all levels), Methods in Multi- and Interdisciplinary Science (all levels)

- Total number of students taught: approx. 4,000
- Average overall teaching evaluation score for all classes: 3.85 out of 4.00
- Ph.D. degrees funded and supervised: 24; Post-docs funded and supervised: 17
- Serving on advisory committees of other graduate students: well over 150

General publication record:

- Total professional publications to date (not including abstracts): 187
- Publications appearing in peer-reviewed books and journals: 164
- Authored or co-authored book chapters to date: 17
- Published book reviews: 10; Published editorials: 12
- Books authored: 1; Books edited: 2

Citations and h-index to date (from Google Scholar):

- Citations to date: over 9,400
- Additional citations currently added each year: over 860
- “h”-factor or index to date: 54

Research funding to date:

- 22.6 million dollars (majority of funding from: National Science Foundation, US Dept. of Energy, Commonwealth of Virginia; minority of funding from: American Chemical Society, Gas Research Institute, US Geological Survey, Pacific Northwest National Labs, Chevron, Texaco, Stanford.)

Service to profession (most important, selected items):

- Hochella has served as President for two major, international geoscience societies, including the oldest and leading geochemical society in the world, and the leading mineralogical society in the world.
- Former President of two major, international, geoscience societies, the oldest and leading geochemical society in the world, and the leading mineralogical society in the world.
- Hochella has served (in dozens of ways), and has been elected to Fellowship in 9 major international scientific societies/organizations. See full list on the preceding page.
- Hochella averages 8 invited talks per year over the last 20 years traveling throughout North America (43 of 50 states and 5 Canadian provinces), as well as 15 other countries in Europe, the Far East, the Middle East, and Africa.
- Hochella founded and is Director of the National Center for Earth and Environmental Nanotechnology Infrastructure (funded by NSF, starting this year). Combined with Pacific Northwest National Labs, in Richland, Washington, they service geo-nanoscientists from across the Commonwealth and the country.

Service to society (most important, selected items):

- Twenty-two of Hochella’s former graduate students and post-docs are now professors at colleges and universities on four continents.
- Hochella has given technical briefings to federal and state governmental bodies and agencies (e.g., U.S. Senate Committee on the Environment, Federal General Accountability Office (GAO), National Science Foundation, U.S. Department of Energy, and Virginia State Senate sub-committees).
- Ten years in development, Hochella led a team that produced a 171-page high school curriculum now published by the National Science Teachers Association (NSTA) in 2012 under the title “Welcome to Nanoscience.” It is now used in high schools nationwide.

## LETTERS OF SUPPORT (Excerpted)

I am pleased to enthusiastically endorse Dr. Michael F. Hochella, Jr. as one of the Commonwealth's outstanding faculty members. As a University Distinguished Professor, Dr. Hochella is ranked among the top one percent of Virginia Tech faculty, with academic achievements recognized across the country and the world. This fall, as a result of his expertise in the field of geo- and environmental nanoscience, the National Science Foundation will establish the Virginia Tech National Center for Earth and Environmental Nanotechnology Infrastructure. The \$2.5 million project has the potential to revolutionize critical fields such as medicine and national security, while advancing our understanding of the world around us. Dr. Hochella's work exemplifies our land-grant mission of discovery that serves humanity, and supports the economic vitality of our Commonwealth. – **Timothy Sands, University President, Virginia Tech**

I have known and worked closely with Professor Hochella since 2006 when I joined Virginia Tech as Director of the Institute for Critical Technology and Applied Science. In my very first meeting with him, I was so impressed by the depth of his technical knowledge and inspirational leadership that I selected him as a thrust leader of one of our most challenging and transformative areas of research-Nanoscale Science and Engineering. He has founded and directed an interdisciplinary Virginia Tech Sustainable Nanotechnology Center, which has gained national recognition for its quality of research and impact. He is a rare individual with uncanny ability to build and inspire a team of highly accomplished faculty and students to excel. He is a world-class researcher, an inspirational teacher and a team player. Simply put, he is a "rainmaker." – **Roop L. Mahajan, Executive Director, ICTAS (Institute for Critical Technology and Applied Science), Virginia Tech**

I have known Professor Michael Hochella for close to fifteen years. It has also been my privilege to have known and interacted with some of the elite scientists of the world in my professional life. These include close to ten Nobel laureates, some Fields Medalists, dozens of members of the National Academies, MacArthur Fellows, Guggenheim Fellows, and recipients of many other awards. I rank Professor Hochella to be in this class. – **Lay Nam Chang, Dean, College of Science, Virginia Tech**

I believe Mike's greatest contribution, and that for which he is most respected and will be remembered for, is his humble and positive way of working among colleagues and students. He has that rare ability to lift up so many around him, in any conversation, at any time of the day. His energy is infectious, his inclusiveness of all those around him leverages his influence, and his deep respect for the individual – no matter at what station in life or academic rank, sets him apart from all others. In my 30-year academic career I have never met such an individual as Mike Hochella, a highly accomplished scholar who is truly humble, and deeply cares about others. – **Paul M. Winistorfer, Dean, College of Natural Resources and Environment, Virginia Tech**

[Michael Hochella] helped create the field of *nanogeoscience* about 10 years ago and has been one of the major players in this field. . . . Mike was one of my early Ph.D. students at Stanford University, receiving his Ph.D. degree in 1981. I have had over 60 excellent Ph.D, and Post-Doctoral students in my 41 years at Stanford and 2 years at Princeton University. Among all of these former students, Mike has had the highest impact academic career and has had a major international influence on the development of the modern fields of geochemistry and mineralogy. – **Gordon E. Brown, Jr., D.W. Kirby Professor of Earth Sciences and Chair, Department of Geological Sciences, Stanford University**

Mike is a pioneer in the field of nano-biogeochemistry. He was the first one in his field to use atomic-force and scanning-tunneling microscopes as well as high-resolution transmission electron microscopes to study surface properties at the atomic level. . . . Mike has been incredible successfully in attracting external funding to the university. To date, his sponsored research programs total ~ \$20 million. That Mike's research is of high impact is reflected in the total citation count of his scholarly output, which has exceeded a phenomenal 8,000 citations (with a corresponding h-index of 50). – **Nancy L. Ross, Professor and Head, Department of Geosciences, Virginia Tech**

I have met Prof. Hochella for the first time at the 6<sup>th</sup> International Conference on the Environmental Effects of Nanoparticles and Nanomaterials in London in September 2011. I made my way to talk to him as a leader in the field of environmental of nano- and geo-sciences. After talking to Prof. Hochella for about an hour, a rare opportunity that pronounced scholars may give to young scientists, I also found Prof. Hochella the most humble scientist I have ever met in my life. Since then I stayed in contact with Prof. Hochella and I sought his advice about the academic life in the United States and about moving to the United State to pursue my academic career at the University of South Carolina. Prof. Hochella strongly encouraged me to take this step. I followed Prof. Hochella advice and moved to the University of South Carolina as a Tenure Track Assistant Professor to discover the US academic life. Of course I then needed an academic mentor who would guide me through the new educational system, and after having several local mentors at the University of South Carolina, I felt that I need a stronger and more helpful mentor. Given his long scientific experience, his humbleness and straightforward advice, I turned back again to Prof. Hochella in June 2014 and sought his help mentoring me as a young faculty and he accepted to support me again in my scientific journey in the United States. Prof. Hochella is mentoring me developing my grantsmanship skills by reading my research proposals and providing me advice on how best to develop and improve these proposals. Following my interactions with Prof. Hochella, I wish that all scientists adopt his values and become equally helpful to young faculty as he is. I aspire to become like Prof. Hochella in the future and to be equally helpful to young scholars, doctoral students and undergraduates. – **Mohammed Baalousha, Assistant Professor, University of South Carolina**

Without any doubt, I can say that Dr. Michael F. Hochella, Jr. has been and continues to be the most influential, charismatic and inspirational person in my scientific and academic career. I am a native of Honduras, a country where science does not exist due to economic and social challenges. Dr. Hochella's mentoring and guidance provided me an opportunity to be exposed to the world-class science, tools, and discoveries that his group has fruitfully developed for decades, but also enabled me to become an independent scientist in my own right. The care, warmth, and effort that Dr. Hochella invests in the relationships and academic success of his students is a trait that makes him uniquely stand out from any other mentor that I have had throughout my education and academic career. . . . In summary, Dr. Hochella is my academic hero and I work each day to honor his spirit of mentoring and guidance and transmit the same caring, warmth and charisma to my own students. – **José M. Cerrato, Assistant Professor, Department of Civil Engineering, University of New Mexico**

Mike Hochella has always employed his intelligence, hard work, humility, and enthusiasm to build up the scientific community; Virginia Tech and the state of Virginia have benefitted tremendously from Mike's dedication to the greater good. This is why so many scientists and engineers from around the world have sought to collaborate with Mike and why his students and postdocs, including an impressive number of women and/or minorities, have been so successful. Members of his group have gone on to win prestigious awards such as CAREER or PECASE or to be elected to membership in the National Academies. Throughout my own career, whenever I have needed advice not just for myself but for a student or junior colleague, I

have turned to Mike. He has always been incredibly kind, generous, and practical. Mike's greatest gift to me, as his former student, is the many times that he has helped me to help others. – **Patricia A. Maurice, Professor, University of Notre Dame**

During my very first semester at Virginia Tech, I had Michael Hochella as my professor in a nanoscience class. At the time, I was very unsure if I wanted to pursue nanoscience but Professor Hochella was incredibly inspiring and caused me to develop a huge curiosity about the nanoscale world. He is the most caring professor I've ever had and he has been a wonderful mentor to me during my time at Virginia Tech. – **Tori Franklin, former student**

Since our first meeting in the fall of 2008, I have enjoyed his continued mentorship on both academic and professional levels. Dr. Hochella is, and continues to be, one of the most genuine, caring, and supportive people I have had the pleasure of knowing. . . . Dr. Hochella had the most impact on my academic and professional career of any professor I had during my undergraduate career. – **Michael Cardman, former student**

What makes [Michael Hochella] unique is his immense focus on the individual concern of every student who comes to him with any sort of problem; his actions dealing with these issues maintain a perfect balance between nurturing, fostering independent strength, and moving you forward. I personally met Michael during his *Introduction to Nanoscience* class; before my enrollment in this class I was a Biological Sciences major with little sense of self-worth and direction of where my future would lay. From day one, he inspired confidence in all of us and immediately broke down the classical barriers that exist between a student and professor. I had him for many other courses after I joined the Nanoscience program, and he has continuously exhibited being a true mentor inside and outside the classroom by guiding me through my young academic journey filled with all sorts of personal and professional obstacles. He played a major part in catalyzing my decision to pursue a PhD, and turning around a young man with no sort of direction into an inspired academic scholar. As an aspiring professor, I hope I can one day emulate the amazing insights he displayed to me onto others. – **Albert Hinman, former student**

What makes Michael so unique is that he combines the comprehensive understanding of a world-class scientist with a sense of wonder and awe that I suspect has remained intact since childhood. He is a masterful communicator - I've attended some of his classes in which he blends science with his own experience and insights, so you get a sense of not only what, for example, a nanoparticle is, but why it's important and how it relates to our daily lives. His students come away inspired and come to think of it, in virtually every serious conversation I've had with Michael I come away inspired, too. – **Jim Metzner, Executive Producer, Pulse of the Planet**

I see fit and choose to write a bit about the self-effacing him, the goofy him, the devoted husband him, the enormously proud dad him, the above average golfer him, the startlingly accomplished charades player him, the high school basketball player him, the pilot him, the adoringly affectionate toward the dogs him, the son of a war hero him, the backcountry hiker him, the him who needs endless stretching beyond his dietary skepticisms, and the him who always opens his door and welcomes folks in with affection that is genuine and genuinely interested in the person on his doorstep. Unpacking all of that would mean writing more than I may, so let the sweep speak for itself: Mike is full of life and filled to overflowing with the love of life, and no stranger to the hard knocks of life. . . . There are many people of great accomplishment in this world. Virtuous people of great accomplishment? Not so many. Mike is one. – **Richard Thayer, Chaplain, Ingleside at King Farm**

## ADDITIONAL DOCUMENTATION

Hochella brings radio program “Pulse of the Planet” to Virginia Tech:

In 2006, legendary radio producer Jim Metzner of New York contacted Dr. Hochella to appear on his longest-running radio program (over 20 years), *Pulse of the Planet*. Hochella’s research has now aired dozens of times on *Pulse of the Planet*. As this program’s website highlights, “Each weekday, the Pulse of the Planet radio series provides its listeners with a two-minute sound portrait of Planet Earth, tracking the rhythms of nature, culture and science worldwide, blending interviews with extraordinary natural sound” (<http://www.pulseplanet.com/>). This program, besides having won multiple radio media awards, five National Science Foundation grants, and a grant from the Grammy Foundation, is listened to by over a million people each week. It airs each workday nationally and internationally on over 260 National Public Radio (NPR) and high-end commercial radio stations (for example, KNX News Radio, Los Angeles), as well as Armed Forces Radio and the World Radio Network out of London, among other foreign outlets.

With the experience and the success of the Hochella programs on *Pulse of the Planet*, and getting to know Jim Metzner very well, Hochella had the idea that he could do what no other university in the country had ever done. This would be to contract Metzner to create *Pulse of the Planet* programs featuring Virginia Tech professors from all eight colleges at the university, bringing their magnificent research to life to this radio program’s broad and educated audience, including the majority of NPR stations across the country. This is exactly what has happened now for the last three years with the vital help of Larry Hincker, Associate Vice President for University Relations, and his staff. Hincker and Hochella have raised the considerable funding necessary to do this (with a significant amount of the money coming from Hochella himself), and *Pulse of the Planet* has now featured well over 60 professors from the colleges of science, engineering, business, liberal arts, agriculture, veterinary medicine, architecture, and the environment.

Below is a screenshot of the National Science Teachers Association (NSTA) website where the Hochella group’s 171-page high school curriculum “Welcome to Nanoscience” is sold. The book is also available on Amazon. This project is described on the top of page 7 above.

The screenshot shows the NSTA Science Store website. At the top is the NSTA logo and navigation links for Books, Journals & Resources, Conferences & Professional Learning, Science Standards, Membership, and About NSTA. Below the header is a banner for the Science Store featuring various books. The main content area displays the product page for "Welcome to Nanoscience: Interdisciplinary Environmental Explorations, Grades 9-12". The product image shows a book cover with a blue and green abstract design. The title is "Welcome to Nanoscience: Interdisciplinary Environmental Explorations, Grades 9-12". The authors listed are Andrew S. Madden, Michael F. Hochella Jr., George E. Glasson, Julie R. Grady, Tracy L. Bank, André M. Green, Mary A. Norris, Andrew N. Hurst, and Susan C. Eriksson. The price is \$20.76 (Member Price) and \$25.95 (Nonmember Price). There is an "Add to Cart" button. To the right of the product page is a sidebar with a search bar, "Browse By Category" (Books, Book Chapters, e-Books, ClassPacks, NSTA Gear, SciGuides, Science Objects, SciPacks, Journal Articles, NSTA Kids), and "Quick Links" (Bestsellers, New and Recent Releases, Award Winners).

Below is a screenshot of the National Science Foundation's Facebook homepage in August 2015 when Hochella and his work were featured.

facebook

Email or Phone \_\_\_\_\_ Password \_\_\_\_\_ **Log In**

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**304,708** likes  
**2,691** visits

**ABOUT** >

  
4201 Wilson Blvd  
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(703) 292-5111  
<http://www.nsf.gov/news/newsmedia/sciencefrontiers/>

**APPS** >

 NSF Email Updates

 Image of the Day

 Science360

 **National Science Foundation (NSF)** added 4 new photos.  
12 hrs · 🌐

Virginia Tech geochemist Michael Hochella does most of his detective work outdoors... sometimes by air... to figure out why heavy metal toxic waste moves downstream in a river much more quickly than it would be expected. We're featuring "Pulse of the Planet" podcasts about his research @Science360 Radio: [1.usa.gov/1H6LCp](http://1.usa.gov/1H6LCp)

#Sci360Radio


Links to podcasts of “Pulse of the Planet” shows that feature Hochella, referred to on the NSF Facebook page just above, are listed here:

- These seven 2-minute programs, heard by millions of radio listeners on NPR and other radio networks, tell the story of the importance of nanoparticles in contaminated rivers.
  - 1) How Toxins Move – Clark Fork River  
<http://www.pulseplanet.com/dailyprogram/dailies.php?POP=5481>
  - 2) How Toxins Move – Hours in the Library  
<http://www.pulseplanet.com/dailyprogram/dailies.php?POP=5482>
  - 3) How Toxins Move – Headwaters  
<http://www.pulseplanet.com/dailyprogram/dailies.php?POP=5483>
  - 4) How Toxins Move – Down the River  
<http://www.pulseplanet.com/dailyprogram/dailies.php?POP=5485>
  - 5) How Toxins Move – Shelved  
<http://www.pulseplanet.com/dailyprogram/dailies.php?POP=4974>
  - 6) How Toxins Move – Samples  
<http://www.pulseplanet.com/dailyprogram/dailies.php?POP=4028>
  - 7) How Toxins Move – Found It!  
<http://www.pulseplanet.com/dailyprogram/dailies.php?POP=5484>
  
- This radio program, heard on *Pulse of the Planet* and other radio networks, including *Science360 RADIO*, tells the story of how “fertilization” of the oceans could help prevent climate change.
  - 1) Fertilizing the Oceans  
<http://science360.gov/radio/episode/2a2c7079-72e3-4f87-89c9-a888d80abcb7/fertilizing-oceans-help-stave-rising-ocean-temps-geochemist-michael-hochella>

Before Hochella became known as a founder of the field of nano-geosciences, he was exceptionally well known in other major subdisciplines of geochemistry, namely “mineral surface chemistry” and “mineral-water interaction”:

In a 2003 book entitled “A to Z of Earth Scientists” by Rutgers University’s Alex Gates (published by Facts on File, Inc. in a series called “Notable Scientists”), 184 of the most influential geoscientists in the world over the last 200 years are described. Michael Hochella is one of the entries in this book, one of only 14 mineralogists named. Of all 184 listed, only 13 are younger than Hochella. The following are selected excerpts from Alex Gates’ description of Hochella’s impact:

*“Michael Hochella has become one of the foremost experts on the surface chemistry of minerals. His papers, “Atomic Structure, Microtopography, Composition and Reactivity of Mineral Surfaces” and “Mineral Surfaces: Characterization Methods and their Chemical, Physical and Reactive Nature” are classics in the field.”*

*“The glamour of genetic engineering and the development of new energy sources, medicines, and superconductors are not typically the realm of the Earth scientist. Michael Hochella, however, is involved in unique research on that level.”*

*“The applications of these techniques to minerals alone are a whole field of research, much of which Hochella defined.”*

*“Like his microbial research, this advanced mineral surface chemical analysis is one of, if not the most, significant and pioneering research that is being conducted today. The potential for important discoveries is immense.”*

Formal, semester-long courses that Hochella has taught since 2003 with numeric overall student evaluation scores:

Course Name	Course no.	Semester	Enrollment	Credits	Score*
Resources	1024	Spring 03	204	3	3.9
Elements of Geo	2104	Fall 03	139	3	4.0
Advanced Topics	6604	Fall 03	6	3	3.8
Resources	1024	Spring 04	208	3	3.8
Elements of Geo	2104	Fall 04	149	3	4.0
Resources	1024	Spring 05	NA**	3	NA**
Elements of Geo	2104	Fall 05	145	3	4.0
Surface Science	6604	Fall 05	8	3	3.9
Resources	1024	Spring 06	210	3	3.9
Elements of Geo	2104	Fall 06	204	3	3.9
Grad Scholars	5984	Fall 06	9	1	3.9
Interdis. Research	5984	Fall 06	11	3	3.7
Resources	1024	Spring 07	207	3	3.8
Grad Scholars	5984	Spring 07	9	3	NA
Elements of Geo	2104	Fall 07	190	3	4.0
Advanced Geochem	6604	Fall 07	11	3	4.0
Elements of Geo	2104	Fall 08	192	3	4.0
Surface Science	6604	Fall 09	7	3	4.0
Elements of Geo	2104	Spring 10	NA	3	NA
Surface Science	6604	Spring 10	NA	3	NA
Intro to Nanoscience	2984	Fall 11	12	3	***
Intro to Nanoscience	2984	Fall 12	10	3	***
Intro to Nanoscience	1015	Fall 13	41	3	4.0****
Professional Dissem	3114	Fall 13	7	1	3.9****
Intro to Nanoscience	1015	Fall 14	52	3	3.7****
Professional Dissem	3114	Fall 14	5	1	3.7****

\* Overall student course/instructor evaluation; highest score is based on a 4.0 scale.

\*\* NA = not available. This number has been lost in our electronic files.

\*\*\* Team-taught with another professor, so score is not given.

\*\*\*\* Evaluations at Virginia Tech are now based on a 6.0 scale. The evaluation score shown here has been converted to a 4.0 scale to be consistent with all the scores above.

Three student comments that give astute and detailed insight into Hochella's teaching methods:

*"I am a student who can easily find things to complain about but I can honestly say Professor Hochella has been the best professor I have ever had and sets a high bar for all the professors I will ever have. . . . It was easy to see his teaching experience and genuine caring personality show through in his classes. . . . He opened up to us like we were all best friends and treated us the same throughout the semester."*

*"Probably the best professor I've ever had at Virginia Tech thus far and definitely one of the coolest teachers I've ever had. I really appreciated that he was very into not only the subject matter, but in our understanding of the material. He really tried to help us in any way possible, which I haven't really seen in my other courses."*

*"I absolutely loved this class. . . . Also, Dr. Hochella is great, he is very helpful, easy going, and smart. These qualities allow him to effectively communicate even the most difficult topics in a way that new students can understand while still maintaining the complexity that makes it new and exciting for more experienced students. His teaching style is also very conducive to actually learning the material and remembering it for years to come."*