



“Science in itself is good since it is knowledge of the world, which is good, created and regarded by the Creator with satisfaction.”

—Pope John Paul II

*Our Catholic Character*  
**Notre Dame Science**

# message from the dean

## Message From The Dean



Any investigation into ourselves and the world where we live involves a scientific dimension. In our science and technology-driven society, this dimension is more significant than ever. The scientist has a fundamental role to play as a contributor to the exploration of big questions on fundamental particles, evolution, underlying mechanisms of disease, and the origins and the expanses of our universe. Scientists are

the first to see the future, and their discoveries, inventions and knowledge can have a tremendous impact on the future, on our society, our culture, our health, our environment and the way we think.

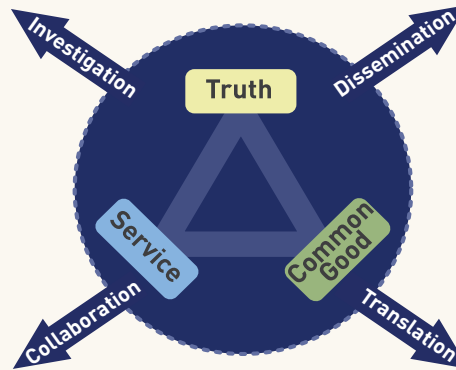
But the scientist's role is not in isolation, and it is not value-free. The scientific enterprise itself is enhanced when the scientist—through personal reflection and dialogue within the field and across the range of disciplines—brings larger questions to bear on research and discovery. These deeper questions about the meaning of life, so far from avoiding hard scientific questions, provide an essential framework for addressing problems in global societies and protect the scientist from a reductionism that fails to understand the fullness of being human.

Scientific research and interdisciplinary dialogue at Notre Dame take place within a thriving, evolving community of people engaged in expanding our understanding of the real universe in which we live. This enterprise takes shape in the context of the living tradition of the University, which takes seriously its commitment to maintain both its Catholicity and its academic integ-

riety, and contributes to that tradition as we move into the future.

Our model in the College of Science, the dynamic interaction of truth, service and common good—vital to all flourishing human communities—characterizes the relationship of science and the Catholic tradition. The unity of those three elements, with service connected essentially to truth and solidarity, not only gives rich meaning to both science and faith but also frees us to investigate all forms of knowledge,

to share the fruits of our investigation with others, to put our discoveries at the service of all, and to answer the call to overcome poverty, injustice and oppression, central to Catholic social teachings. The elements of our triangle are connected through our Notre Dame mission. Our porous boundary represents our unity of purpose with the world,



through investigation of nature and life; through disseminating our findings in papers, publications, presentations, patents, and outreach; through translating our discoveries and findings into societal and human good with Innovation Park and the Indiana School of Medicine. We collaborate with our neighborhoods, communities, nation, and world, including partnerships with other private and public entities, other universities and foundations as well as our presence in disparate parts of the world.

Yours in Notre Dame,

Gregory P. Crawford,  
William K. Warren Foundation Dean  
College of Science

## our character

# Our Character

The College of Science at the University of Notre Dame is a thriving, evolving community of people engaged in expanding our understanding of the universe in which we live. We work in the context of the living tradition of the University and advance it into the future. Just as any living thing interacts with its environment, the college has a distinctive character because Notre Dame takes seriously its commitment to maintain both its Catholicity and its academic rigor. Our character contributes to the ecosystem of the college, the University, the wider field of teaching and research and, ultimately, the whole world. Our activity begins with wonder at our world, and the fruit of our work returns to the world in the form of understanding and improvement. We are at work on the big questions of science in the context of the big questions about human beings that can give all of our understanding coherence.

## our history

# Our History

Notre Dame's storied past and premier status as a teaching and research University provides fertile soil for our work. Here, professor of chemistry Rev. Julius A. Nieuwland, CSC, discovered synthetic rubber; former university president Rev. Theodore Hesburgh, CSC, was a founding member of the National Science Board, and Knute Rockne, pharmacy alumnus and professor of chemistry, coached football. Resources from the past—spiritual, social, intellectual and material—support us as we move into the future. Our understanding of vocation and meaningful work enhances the satisfaction of learning and discovery. Our identity as a Catholic university comes with a commitment to universality which promotes unity. We see faith and reason, theoretical and practical, mind and heart, material and spiritual as complements in a transcendent whole. Proud to be Notre Dame, the College of Science is a diverse community, working in solidarity with every human being.

Our science addresses the biggest ideas of our time with its best tools. That is part of our tradition. More than 100 years ago, Rev. John Zahm, CSC, a chemistry and physics professor at Notre Dame, wrote publications embracing evolution and the role of women in science in the early 1900s. Today our faculty and students investigate its operation across a broad range of topics. Some are applying what we learn about evolution to modern environmental and ecological issues, inspired in part by the church's call to care for all of life on Earth.



Rev. John A. Zahm



Dennis Jacobs

“Here, the pursuit of truth and knowledge is a common endeavor. It's what binds us together. We're all in the pursuit of truth. My conversations with students are seldom confined simply to science; we talk about life and the meaning of life.”

—Dennis Jacobs  
Vice President and Associate Provost and Professor of Chemistry and Biochemistry

“When I came to Notre Dame, I found a Catholic University which reflected the diversity of New World thought. I found faculty members, staff and students who were Catholic, Protestant, Hindu, Muslim and Jewish. People came to Notre Dame from North and South America, Europe, Asia and Africa. I had entered a multicultural University, which was both comfortable and exciting without losing sight of its Catholic character...I am part of the community without compromising my Jewish heritage.”

—Morris Pollard  
Professor Emeritus



Rev. Julius A. Nieuwland, CSC



David Severson

## *collaboration leads to discovery* **Collaboration Leads to Discovery**

The spirited dialogue goes on within departments, among departments and across the Notre Dame campus, as well as with other academics and professionals across the country and around the world. We talk to one another. We are in search of understanding both for its own sake and to serve humanity. At Notre Dame those goals are not in competition. Rather, progress binds them together. Basic research is undertaken purely for the sake of understanding, a result of irresistible curiosity about the world around us. Its discoveries can become the basis for breakthroughs in nutrition, healing, technology, environmental protection and other improvements in the quality of human life everywhere.

“The discovery of something absolutely new is the objective of research, and though apparently not very important for the time being, each new truth may become useful in the future.”

— Rev. Julius A. Nieuwland, C.S.C.

## *interdisciplinary dialogue leads to service* **Interdisciplinary Dialogue Leads to Service**

In addition to the conversation on teams and within departments, the dialogue extends throughout the college because the proper focus of each discipline—biological sciences, mathematics, physics, and chemistry and biochemistry—is understood as a resource for all. Because our aim at Notre Dame is advancing the well-being of all life in all its aspects, our dialogue engages others in engineering, business, arts, history, social sciences, theology, philosophy, law, architecture and every other human endeavor. Just as cooperation between a nuclear astrophysicist and a chemist can further their scientific projects, dialogue among biologists, historians, ethicists and theologians can foster a greater human understanding. Enterprises such as Notre Dame’s Center for Social Concerns afford abundant opportunities for science students to integrate learning with service. Students are involved in both research and outreach, from discovering how the nervous system of the mosquito develops to traveling to Africa to participate in malaria research.

“I don’t have to be Catholic to feel part of the mission. I know this has a potential to impact people. One of the advantages here is that Notre Dame has the capacity to really immerse ourselves in that. People who are attracted to Notre Dame are not only passionate about their science, but they’re passionate about their interest in people.”

— David Severson  
Director of the Eck Institute for Global Health and Professor of Biological Sciences

# *our faith in action: service*

## Our Faith in Action: Service

The Eck Institute for Global Health is one of several centers of the college that exemplifies the integration of basic research, application and social justice—as well as interdisciplinary cooperation within the college and across the University. Community spirit, team effort and dedication to a common mission foster both personal and professional satisfaction. For example, the work of Mary Ann McDowell, assistant professor of biological sciences, on Leishmania, a parasite responsible for the affliction known as Baghdad Boil, helps to map the immune system and promises to relieve suffering.

The institute has a core group of about ten faculty members but involves nearly thirty people from across the University including faculty from the Departments of Chemistry and Biochemistry, Civil Engineering and Geological Sciences, Computer Science, Anthropology and Theology.

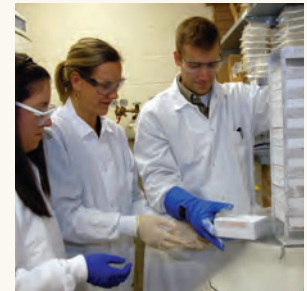
“Most of what we do is basic research, which is pretty much a staple for academics,” says David Severson, professor of biological sciences and the director of the Eck Institute for Global Health. “Some of that can actually transition into something applied. That’s something at the top of our mind: basic research that has applied potential. We have a lot of people working on basic research. We can’t develop products if we don’t understand the basic biology behind how things work.”

On the applied end of the research spectrum, Rev. Thomas Streit, CSC, of the Department of Biological Sciences has received international acclaim for his work and dedication among impoverished Haitians halting the spread of lymphatic filariasis, a disease which causes grotesquely swollen limbs and genitalia. Father Streit recruits and trains young Haitians to educate villagers about medication that can alleviate the parasitic disease.

As director of the Center for Zebrafish Research, David Hyde’s 13 years of research on the zebrafish’s ability to regenerate neuronal stem cells in the central nervous system, could lead to an understanding of why human cells do not regenerate at similar levels. That could lead to treatments for such problems as glaucoma and macular degeneration in the eyes, Alzheimer’s and Parkinson’s in the brain, and perhaps even spinal cord injuries.



Rev. Thomas Streit, CSC



Mary Ann McDowell

“Our Catholic character is really important. Being here has helped me see the big picture more. Undergraduate students have a strong tradition in service. It’s definitely part of Catholic teaching. This University has taken that seriously and promotes that. The other issue is ethics. We’re always talking about ethics and the ethical way to do things.”

— Mary Ann McDowell  
Assistant Professor of Biological Sciences



David Hyde



Matthew Gursky



Kasturi Haldar  
Center for Rare and Neglected  
Diseases

“You can talk about science without a religious discussion. However, if you consider the University as more than a collection of separate departments having a global view, I don’t see how you cannot take religion seriously. Notre Dame has a sense of self-identity. It came out of a very specific religious and cultural background.”

— Matthew Gursky  
Professor of Mathematics

“We’re looking at the origin of the universe, its structure, its ongoing evolution and its future. How did we get the stuff we’re made of? How did we get the planet we live on? How did we get the galaxy we’re in? We’re trying to figure out how the universe works. There’s a larger sense of purpose here. There’s a different feeling.”

— Chris Howk  
Assistant Professor of Physics

In the tradition of Catholics from Copernicus to Rev. Georges Lemaitre, C.S.C., who first proposed what became known as the Big Bang theory of the origin of the universe, Notre Dame researchers are asking big questions about the whole creation. Our share in the Large Binocular Telescope supports work such as that performed by Peter Garnavich, professor of physics, on the study of novae aimed at understanding how the universe expands. Not even the sky is the limit.

The Center for Rare and Neglected Diseases focuses on diseases that affect less than 200,000 people in the US per year. With few corporations working on cures and treatments for rare diseases, Notre Dame’s role in helping patients and their families who are affected is significant. Teamed with the Ara Parseghian Medical Research Foundation, the center has a focus on Niemann Pick disease, a rare neurodegenerative disease that affects children.

Drug discovery efforts are well-aligned with the mission of the University of Notre Dame and exemplify our Catholic character. Both medicinal chemistry and drug design are significant strengths of the Department of Chemistry and Biochemistry. Members of the drug design group are seeking to develop chemotherapeutic agents targeting a broad range of diseases. Shahriar Mobashery, the Navari Chair in Life Science and professor of chemistry and biochemistry, has recently identified potent inhibitors of enzymes that are showing great promise as a means of preventing the cell injury and death associated with strokes and other neurodegenerative diseases. In addition, Bradley Smith, Hofman Professor of Chemistry and Biochemistry, has made fluorescent imaging probes which will accelerate the pre-clinical stages of drug discovery and development, and also enable new strategies for studying the biology of human disease. Related efforts are directed towards cancer, diabetes, and rare genetic diseases.

Applied mathematics, including work in the Center for Applied Mathematics, deals with modeling nature, life and our universe in ways that advance the important work of science and engineering. Pure math, which some consider the purest form of science, also connects to the Catholic mission, with its deep rational reflections on the finite and the infinite. A contemplation of the beauty and explanatory power of mathematics can provide a unique insight into our world.

The University is the site of a wealth of cutting-edge departments, centers and institutes with national impact because of its respected intellectual tradition. Our Catholic mission is part of the identity of the College of Science, as a root that enriches. We stand in a tradition that has fostered science for centuries.



Rev. John Jenkins, CSC



Rev. James Foster, CSC

## connecting science and religion

# Connecting Science and Religion

We link intellectual virtues and moral values in our research and teaching. We seek to unify insight with conviction in pursuit of a coherent understanding of the universe and the human person. Our faith in the goodness of human beings and human reason frees us to seek a broader investigation.

Our founding vision calls us to cross what some would make boundaries in order to consider the ethical implications of our work—in our own reflection, with our colleagues in the college, and across the University with experts in other disciplines such as philosophy and theology.

The environment that encourages collaboration and service—within departments, across the College, around the campus and out into the world—reflects our vision of an integrated community. We share a common unity and purpose. We are aware that each field in which we work is part of a larger ecosystem, embracing both the natural world and human society. Our work strives to overcome the fragmentation that can result from severing technical knowledge and human values. Our challenge is to remain committed to the dialogue between faith and reason, person and community, mind and heart, religion and science. This enriches our work and our lives.

With the common goal of discovering truth, religion calls on science to consider the larger implications of its discoveries, and science calls on religion to take into full account the reality of the natural world. Our work with one another, with our colleagues and with the wider world includes a mutually beneficial dialogue in service of knowledge, truth, dignity and the fulfillment of human life.

“At Notre Dame, and in the Catholic tradition generally, faith and science belong together. Science provides us with extraordinary knowledge about the universe God created. Faith teaches us that God created and upholds an ordered universe, one that can be understood by science. And together, faith and science strive for a world in which understanding serves human dignity and the common good.”

—Rev. John Jenkins, CSC  
President

“Notre Dame provides the space for both intellectual advancement and personal growth. Inspired by Fr. Basil Moreau, the founder of the Congregation of Holy Cross, we strive to connect learning in the classroom and research labs with student life in the dorms, service activities, and a wide variety of clubs and sports. It is this holistic context of human formation that encourages our students, indeed all who work, teach and study here, to grow in knowledge, love, and commitment to our community and society.”

—Rev. James Foster, CSC  
Director, Center for Health  
Sciences Advising

*saint albert the great, o.p.*  
**patron saint of scientists**

“Science does not consist simply in believing what we are told, but in inquiring into the nature of things.”

—Albert the Great

Inspired by St. Albert, seeker of truth and patron saint of scientists, we pray to God, saying,  
O GOD, GUIDE OUR WAY

Awaken us to the beauty of earth and all its creatures, we pray:  
O GOD, GUIDE OUR WAY

Inspire scientists to use their gifts well in studying the wonders of creation, we pray:  
O GOD, GUIDE OUR WAY

Bless all who devote themselves to scientific research for the benefit of the human family, we pray:  
O GOD, GUIDE OUR WAY

May scholars and scientists revere Your truth and Your power, we pray:  
O GOD, GUIDE OUR WAY

O God, in Saint Albert you so wonderfully blended human wisdom and divine faith. Keep us true to his spirit so that through all the sciences we may serve humanity and come to know and love you more profoundly. We ask this in Your name, You who hold all life together, and through the power of Your Holy Spirit, now and forever. Amen.

Author: Sister Kathleen Cannon, O.P., Associate Dean, College of Science

