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## Nurturing Student Scientists as People of Faith

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### Abstract

The Loyola Marymount University (LMU) campus community fosters the interplay between religious faith and scientific reason. Not only is this evident by honoring scientists in the stained-glass windows of Sacred Heart Chapel, but the culture invigorates a disproportionate number of science students to actively engage with the faith community. This integration might seem counter to society's norms, but it is well aligned with the teachings of the Catholic Church and Jesuit tradition. Jesuit universities, in particular, have a unique role to play in fostering the mutual enrichment between faith and scientific reason. Education should be used to bridge the misunderstandings between faith and science. Faculty members, particularly at Jesuit universities, have a wonderful opportunity to share their experiences with students through teaching and scholarship.

*"Faith and reason are like two wings on which the human spirit rises to the contemplation of truth; and God has placed in the human heart a desire to know the truth—in a word, to know himself—so that, by knowing and loving God, men and women may also come to the fullness of truth about themselves."*

– St. John Paul II, *Fides et Ratio*

Walking into Sacred Heart Chapel, the spiritual heart of the campus community at Loyola Marymount University (LMU), visitors often notice the high ceilings, the hanging chandeliers, or the beautifully carved main altar and ambo. Some notice the stained-glass windows; one set in particular catches the eyes of scientists (fig. 1a and fig. 1b). In the lower section along the west wall there are two windows that honor scientists and great thinkers.



**Figure 1a.** Stained-glass windows in LMU Sacred Heart Chapel honoring scientists and great thinkers.



**Figure 1b.** Stained-glass windows in LMU Sacred Heart Chapel honoring scientists and great thinkers.

The windows reference Louis Pasteur, Albertus Magnus, St. Thomas Aquinas, and Guglielmo Marconi, among others. Louis Pasteur was a Catholic microbiologist who revolutionized the field through discoveries of pasteurization and vaccination.<sup>1</sup> St. Albertus Magnus (Albert the Great) was a Dominican friar and Catholic bishop who established the study of nature as a legitimate science within the Christian tradition; he argued that “faith and science may go hand-in-hand.”<sup>2</sup> St. Thomas Aquinas was a Dominican friar and Catholic priest who was a proponent of natural theology and believed that we seek truth through faith and reason.<sup>3</sup> Guglielmo Marconi, known for his work with long distance radio transmission, confirmed his

McGrath & Reilly,  
*LMU President's  
Institute  
Collection:  
Introduction and  
Overview*

Snyder, *Necessary  
Companions:  
Faith and Reason*

McGrath & Reilly,  
*President's  
Institute on the  
Catholic  
Character of  
LMU: A Twenty-  
One-Year  
Tradition*

Bouvier-Brown,  
*Nurturing Student  
Scientists as  
People of Faith*

Jarvis, *Faith  
and Reason in  
the Pursuit of  
Understanding*

Rohm, *Our  
Students' Search  
for Meaning*

Scheibler, *What  
Can TV Teach Us  
About the  
Spiritually Healthy  
Institution?*

Reilly & McGrath,  
*Faith and Reason  
in Antiquity:  
A Photo Essay*

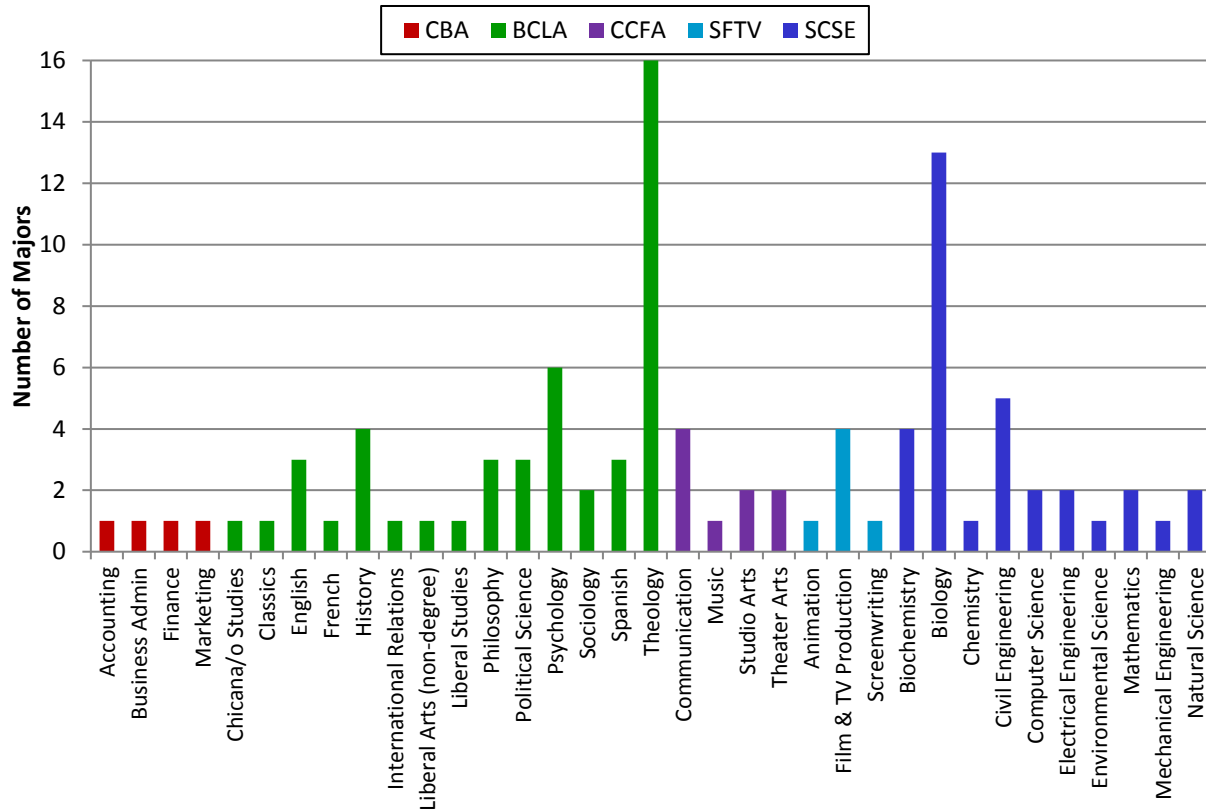
Catholic faith as an adult.<sup>4</sup> He not only was awarded the Nobel Prize in Physics for wireless telegraphy, but he also personally introduced the first radio broadcast of a pope (Pope Pius XI) in 1931.<sup>5</sup>

The LMU community allows science into its main place of worship and nurtures the interplay between religious faith and scientific reason. I am quite certain that few people have even noticed these windows; I consider it a good sign that the community does not make a big deal about this subtle mixing of science and religion represented by these windows.

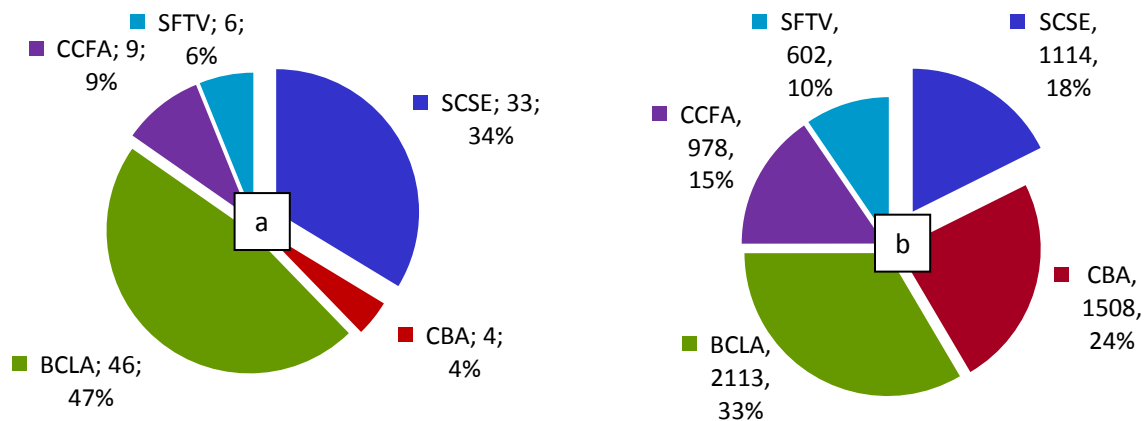
Regardless of the contemporary cultural trends, faith and scientific reason are in harmony. As briefly discussed below, there is a long and robust Catholic intellectual tradition of the synthesis of faith and scientific inquiry, highlighted by the many examples of great Catholic scientists. We at Jesuit universities are uniquely positioned to educate our students, especially science majors, in the Catholic tradition by intentionally integrating faith and reason into teaching and scholarship. Faculty and staff should be open to discussing these topics with students to demonstrate how we experience and engage the balance of spirituality and reason.

### **Religious Faith and Scientific Reason at LMU: What the Data Show**

The balance of faith and reason is so engrained in the fabric of LMU that we rarely explicitly discuss it. A culture of mutual respect and acceptance between these two fields is present and many students seem to understand how to balance faith and reason in their own lives. In fact, data from LMU Campus Ministry show a disproportionate amount of student campus ministers come from the College of Science and Engineering. Between Fall 2010 and Spring 2017, 79 students served as sacristans and acolytes for the LMU community. Those 79 students were studying 98 academic majors (19 students have a double major); figure 2 shows the fields of study and corresponding student distribution. Of these 97 majors, 34% were in the fields of science, mathematics, or engineering (housed in the Seaver College of Science and Engineering [SCSE]) while the average enrollment in Seaver College over this 7-year period was only 18% of the entire LMU community (fig. 3). In addition, 14% of the students who served as sacristans and acolytes had a combination (major and minor or double major) that included both theology (including Catholic studies or peace studies) and science (including math and engineering). This data set focuses on sacristans and acolytes because these students tend to be more heavily involved in Campus Ministry.



**Figure 1.** Distribution of major areas of study by sacristans and acolytes from Fall 2010 through Spring 2017, color-coded by LMU college. CBA (red): College of Business Administration; BCLA (green): Bellarmine College of Liberal Arts; CCFA (purple): College of Communication and Fine Arts; SFTV (light blue): School of Film and Television; SCSE (dark blue): Seaver College of Science and Engineering.



**Figure 2.** (a) Academic majors studied by students who serve as sacristans and acolytes from Fall 2010 through Spring 2017 divided by LMU college; (b) Average LMU campus enrollment from Fall 2010 through Spring 2017, broken down by college.

While it is not surprising that students involved in Campus Ministry would also have interest in

theological studies, the connection between studying science and involvement with Campus

Ministry is less intuitive. There is a disproportionate amount of science students engaged in seeking the divine through their studies and service to the community.

One of the students explained the connection by saying:

Many of our studies in our science courses drew us to the existential questions involved in theology. Our experiences with Campus Ministry and our studies in our theology courses likewise enriched and gave a certain depth to what we learned in our science classes.<sup>6</sup>  
– Helena Olivieri (B.S. Biology, B.A. Theology '14; M.A. Bioethics '16)

Students want to contribute to the communal worship, share the experience with others, and build relationships. Once a significant population of science majors was involved in Campus Ministry, it became accepted practice and more students joined the ministries. This created a culture of self-reinforcement.

### **Jesuit Tradition and the Cultural Misrepresentations of Faith and Reason**

These data clearly show that LMU, a Catholic, Jesuit, liberal arts, primarily undergraduate institution, fosters and encourages the symbiotic relationship between faith and reason. Catholic faith and scientific reason actually *enrich* each other. To outsiders, this integration may seem to run against society's norms because of the perceived tension between faith and reason found in science. There is some historical truth to this notion; the most famous example is of Galileo Galilei's insistence that the solar system was heliocentric, which was contrary to the Roman Catholic Church's commonly held geocentric view. Even in the present day, this misguided conflict is unfortunately reemphasized by a vocal few on both sides of the argument (e.g., creationists vs. atheists) and dictated and/or motivated by mass media's tendency to cast complex issues as "black and white." The average media consumer can be misled to think that there is a mutually disqualifying conflict between science and faith, as if only one is correct and the other has a delusional view of the world.

After the release of Pope Francis's encyclical on the environment (*Laudato Si'*), some comments from media and political circles suggested that a religious leader is not allowed to speak about scientific topics. Former Congressman Rick Santorum said that Pope Francis should "leave science to scientists" and former Governor Jeb Bush said "I don't get economic policy from my bishops or cardinals or my pope."<sup>7</sup> Never mind that the Pope was a chemist (so he *is* a scientist), but His Holiness was not writing as a scientific authority. He clearly uses data to make a moral argument, and no one would deny the fact that the Pope can speak to morality. Science often raises questions that are moral or philosophical in nature, and thus faith or spirituality is necessary to guide human responses and calls to action. These comments are likely politically motivated, but they nevertheless reinforce the notion that there is a large separation between faith and reason in popular culture.

Some academics appear to share these misconceptions about the relationship between faith and science. The apparent conflict seems to arise "through a mistaken interpretation of faith...a misunderstanding of science...or both."<sup>8</sup> For example, this author has heard of specific instances on a small Catholic liberal arts campus where students and faculty alike fail to understand the teachings of the Catholic Church on evolution. One student thought she couldn't be Biology major and study genetics because she is Catholic. One faculty member assumed that since she is at a Catholic university, she could not invite a guest speaker who would talk about evolution. This is certainly not the whole truth. Many of the world's most famous scientists were Catholic. For example, Gregor Mendel was an Augustinian monk who founded modern genetics, and Monsignor Georges Lemaitre was a Belgian priest who proposed the Big Bang theory.<sup>9</sup>

Religious within the Society of Jesus, in particular, have made numerous contributions to all fields of math and science: astronomy, physics, mathematics, biology, and seismology, to name a few. Initiated by Christopher Clavius (1538–1612), a mathematician and astronomer, Jesuits have an unparalleled history of exploring the natural world without compromising their Catholic faith.<sup>10</sup> The

Jesuit priest-scientist, as defined by Fr. Frank R. Haig, S.J.,

is motivated as is any scientist by the sheer desire to understand, by simple curiosity. But once he has come to know and master his science, and to the extent that he has mastered it, he must then attempt to make the world of faith and the world of science transparent to each other, to keep the bridges open and traffic flowing back and forth.<sup>11</sup>

Exceptional examples of Jesuit scientists are: Angelo Secchi, one of the first astronomers to authoritatively state that the sun is a star; James Macelwane, a pioneering American seismologist; and Pierre Teilhard de Chardin, a geologist and paleontologist who was involved in discovering the so-called Peking Man.<sup>12</sup> Astronomy has been a specific scientific field in which Jesuits have left their mark. Throughout the 16<sup>th</sup> and 17<sup>th</sup> centuries, Jesuit scientists introduced Western astronomy to China and took Eastern culture and knowledge back to Europe. For 150 years, Jesuits directed the Imperial Astronomical Observatory while adopting the dress and manners of Chinese scholars.<sup>13</sup> Even today, one of the most famous astronomical research institutions is the Vatican Observatory, which is run by Brother Guy Consolmagno, S.J., an American Jesuit.

### **A Holistic Approach to Faith and Reason at Jesuit Universities**

Education is the best way to bridge the alleged gap between faith and reason. While Jesuit faith is rooted in the Roman Catholic tradition, “faith” can be more generally described as spirituality. Being at awe with the natural world is similar to St. Ignatius Loyola’s suggestion to “find God in all things”—the “signature spirituality of the Jesuits.”<sup>14</sup> This type of spirituality is welcoming to people of any faith tradition.

Academics should help students fully explore and appreciate both faith and reason; these topics should freely “cross-pollinate” across campus. Science should be taught in theology and spirituality should be brought into science classrooms. Liberal arts students need to be scientifically literate, while science students need

to contemplate moral frameworks and enjoy a sense of awe about their studies. The content of a science class must remain scientific, but why not take a moment to sense the awe of what is being learned? Science gives us a means by which we can try to understand creation with fine detail and how we, as humans, fit into the preexisting natural world. How can we *not* be at awe with the marvelous beauty and order of the universe?

Faculty members need to allow time for reflection in all courses. Ignatian pedagogy suggests that instructors should guide students on how to think and reason in their field of study.<sup>15</sup> The goal in science courses is to create a thoughtful, deliberate, conscientious citizen with scientific literacy. In order for the content to extend outside of the classroom, Ignatian pedagogy recommends continuous student reflection and self-evaluation.<sup>16</sup> At LMU, like other Jesuit universities, educators have a unique ability to couple faith and reason in all courses; doing so would simply be incorporating the mission into course content.<sup>17</sup>

Faith and spirituality can also direct the focus of academic scholarship. Faith provides a moral compass to guide scientific inquiry and how that scientific discovery should be used in the world. Albert Einstein famously said, “For science can only ascertain what is, but not what should be, and outside of its domain value judgments of all kinds remain necessary.”<sup>18</sup> Einstein not only developed the atomic theory that would be used to create the atomic bomb, but he also wrote a letter to President Franklin Roosevelt that helped to initiate the creation of the Manhattan Project so that the United States’ technology would stay ahead of that of the Nazis.<sup>19</sup> Especially since the Germans did not end up creating an atomic bomb, Einstein later wished he hadn’t sent the letter. As human beings, we are able to manipulate the world around us, but God also instilled in us a sense of morality to decide how and why our actions will be done.

We can also use scientific reason and scholarship to address moral concerns. For example, science has shown that the poorest, most vulnerable people in the world will be most affected by climate change, which is mainly a result of the development and excess of the richest countries.

Scientific reasoning can promote social justice and faith can motivate individuals to act. Research that uses science to understand truths about human suffering is particularly potent when we involve undergraduate students as investigators in such projects. These experiences can in turn deepen a researcher's faith.

The best way to ensure that Jesuit universities continue to grow as campuses intertwining faith and reason is by having faculty and staff open to discussing these topics with students. Educators need to allow themselves to be "whole people"—who are more complicated and more interesting than the "black and white" impressions that students often hold. Students often seem surprised to see faculty members at Mass on Sunday morning. Students are always interested in seeing and getting to know their faculty and staff as people. Honest discussions with them across the campus will illuminate how each individual approaches, and often struggles with, these topics that shape academic and personal identities. It's not about teaching something in particular; it's about a particular faith background. It's about being present.

## Conclusion

Students want to engage in conversations about faith and reason. They may not explicitly know it as such, but that is part of the reason why they came to a Jesuit university. A successful education provides the environment for a student's personal growth. The job of educators is to challenge them to expand their minds and become thoughtful, purposeful young adults. The relationship between faith and scientific reason is an integral part of the message that any Jesuit university should impart to its students. HJE

## Notes

- <sup>1</sup> Agnes Ullmann, "Louis Pasteur," *Encyclopedia Britannica* 2015, accessed April 27, 2016, <http://www.britannica.com/biography/Louis-Pasteur>.
- <sup>2</sup> "Saint Albertus Magnus," *Encyclopedia Britannica* 2015, accessed May 1, 2016, <https://www.britannica.com/biography/Saint-Albertus-Magnus>; Daniel Kennedy, "St. Albertus Magnus," *The Catholic Encyclopedia* (Robert Appleton Company, 1907), accessed April 27, 2016, <http://www.newadvent.org/cathen/01264a.htm>.

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<sup>3</sup> Daniel Kennedy, "St. Thomas Aquinas," *The Catholic Encyclopedia* (Robert Appleton Company, 1912), accessed May 1, 2016, <http://www.newadvent.org/cathen/14663b.htm>.

<sup>4</sup> M. C. Marconi, *Marconi My Beloved* (Boston: Dante University of America Press, 2001), 22-23.

<sup>5</sup> Marconi, *Marconi My Beloved*, 208; Brian Kelly, "80 Years of Vatican Radio, Pope Pius XI and Marconi...and Father Jozef Murgas?," *Catholicism.org*, February 18, 2011, accessed May 1, 2016, <http://catholicism.org/80-years-of-vatican-radio-pope-pius-xi-and-marconi-and-father-jozef-murgas.html>.

<sup>6</sup> Helena Olivieri, email message to Nicole Bouvier-Brown, April 14, 2016.

<sup>7</sup> C. Hale, "Jeb Bush's Response to Pope Francis's Climate Change Encyclical Is Hogwash," *Time*, June 17, 2015, accessed April 27, 2016, <http://time.com/3924287/pope-francis-climate-change/>.

<sup>8</sup> Christopher Kaczor, "The Church Opposes Science: The Myth of Catholic Irrationality," in *The Seven Big Myths about the Catholic Church* (San Francisco: Ignatius Press, 2012), 35.

<sup>9</sup> Bertram Windle, "Mendel, Mendelism," *The Catholic Encyclopedia* (Robert Appleton Company, 1911), accessed May 1, 2016, <http://www.newadvent.org/cathen/10180b.htm>; Joseph R. Laracy, "The Faith and Reason of Father George Lemaître," in *Homiletic & Pastoral Review* (February 2009), 50-59, reprinted at CatholicCulture.org, accessed May 1, 2016, <https://www.catholicculture.org/culture/library/view.cfm?rcnum=8847>.

<sup>10</sup> A. Udías, *Jesuit Contribution to Science: A History* (Switzerland: Springer International Publishing, 2015).

<sup>11</sup> Frank R. Haig S.J., "The Vocation of the Priest-Scientist," *Bulletin of American Association of Jesuit Scientists* 36 (1961): 8.

<sup>12</sup> Udías, *Jesuit Contribution to Science: A History*.

<sup>13</sup> Ibid.

<sup>14</sup> "Finding God in All Things," Jesuits.org, accessed April 28, 2016, <http://jesuits.org/spirituality>.

<sup>15</sup> Sharon J. Korth, "Precis of Ignatian Pedagogy: A Practical Approach," in *A Jesuit Education Reader* (Chicago: Loyola Press, 2008), 280-84.

<sup>16</sup> Ibid.

<sup>17</sup> "Mission," Loyola Marymount University, accessed April 28, 2016, <http://www.lmu.edu/about/mission/>.

<sup>18</sup> Albert Einstein, "1939: Princeton Albert Einstein Solves the Equation," *Lapham's Quarterly* 3, no. 1 (Winter 2010): 25-28.

<sup>19</sup> "The Manhattan Project," American Museum of Natural History, accessed April 28, 2016, <https://www.amnh.org/exhibitions/einstein/peace-and-war/the-manhattan-project/>.