



Special Report

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Findings from Five Countries on the Role of Science and Religion in Seminaries' Curriculum

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“This is a valuable topic that we obviously need to reflect upon further. Unless seminary curriculums address the epistemology and methodology of the dialogue between science and faith, we risk losing the young who are steeped in STEM courses in school or developing congregations that are reactionary to the scientific view and its integration into the faith.” —RECTOR OF A U.S. MAJOR SEMINARY

The intersection of science and religion is explored in many normative documents of the Catholic Church, including *Gaudium et Spes: Pastoral Constitution on the Church in the Modern World* (1966a), *Optatam Totius: Decree on Priestly Training* (1966b), *Ratio Fundamentalis Institutionis Sacerdotalis: The Gift of the Priestly Vocation* (1970), *Dabo Vobis: On the Formation of Priests in the Circumstances of the Present Day* (1992), *Catechism of the Catholic Church* (1997), and *Laudato Si: On Care for Our Common Home* (2015). In general, the Church teaches that “methodical research in all branches of knowledge, provided it is carried out in a truly scientific manner and does not override moral laws, can never conflict with the faith, because the things of the world and the things of faith derive from the same God” (*Catechism of the Catholic Church* 1997, §159).

There is an established body of research exploring the relationship between exposure to science (e.g., level of education) and religious commitment (e.g., church attendance rate). This research tends to indicate a negative relationship between them (e.g., Knapp and Greenbaum 1953, Lazarsfeld, Thielens, and Riesman 1958, Stark 1963) although some studies find a positive relationship (e.g., Stark 2003). The results pertaining specifically to Catholics vary from those for the general population. For example, according to the 2014 U.S. Religious Landscape Study (Gecewicz and Smith 2017) based on a telephone survey of 35,000 Americans from 50 states, U.S. adults with college degrees are less religious than those without a college degree. However, among U.S. Catholic adults, religious commitment increases with more education (i.e., 60 percent of U.S. Catholics with a high school education or less expressed high religious commitment as compared to 61 percent of those with some college education and 62 percent of those who graduated college). According to a 2005 random survey of 2,198 faculty members from 21 elite U.S. research universities (Ecklund and Scheitle 2007), scientists are 38 percentage points less likely to be religiously affiliated than members of the general population. However, the differences between Catholic scientists and Catholics in general population is not as pronounced (i.e., 0.8 percentage point difference for liberal Catholics, 5.7 for moderate Catholics, and 6.2 for traditional Catholics).¹

One important way of closing the gap between Church teaching, public perceptions, and practices of the faithful might be in preparing priests who have a good general understanding of the sciences and who are equipped to evangelize in a world shaped to a considerable extent by science and technology. The United States Conference of



FIGURE 1. ST. MARY'S SEMINARY AND UNIVERSITY IN BALTIMORE, MD. Courtesy of Forsaken Fotos

Catholic Bishops takes a step in this direction by instructing in the *Program of Priestly Formation* (2006) that the curriculum of studies of college seminarians must include a grounding in sciences. So far, there are no published, systematic studies assessing how those guidelines are followed and what is the current state of seminary preparation on the intersection of science and religion. This Special Report addresses this issue by examining (1) seminary rectors' opinions regarding the importance of seminarian preparation to evangelize in a scientific and technological world, (2) seminary faculty's background in science, and (3) the integration of topics on science and religion into seminarians' formation (through curricular and extracurricular activities).

The report uses the responses from a CARA 2017 national census of all 68 Catholic major seminaries in the United States (with a 75 percent response rate). The analysis is supplemented by responses to the same questionnaire administered to a convenience sample of 30 major seminaries in Australia, Canada, Ireland, and South Africa (with a 23 percent response rate).

LEADERSHIP

The formation of seminarians is in part determined by the attitudes of rectors and directors of spiritual life who oversee the curriculum and approve extracurricular activities. In U.S. major seminaries, the majority of current rectors and directors of spiritual life have not served in their positions long enough to see the recent seminary class through the entire process of seminary formation. Seven in ten rectors (73 percent) and three in five directors of spiritual life (60 percent) began their appointment more than four years ago (in 2014 or before).

Over half of the rectors believe that human sexuality and euthanasia are very important topics for seminarians' preparation to evangelize in a scientific and technological world. More than a quarter shares this belief regarding genetic engineering and scientific method. College seminary rectors are 28 percentage points more likely than theologate rectors to consider internet technologies very important. On the other hand, theologate rectors are 15 percentage points more likely than college seminary rectors to consider euthanasia very important.

Topics on the intersection of science and religion that rectors consider important to good preparation of the seminarians can be organized into four general themes:

- Abstract understanding of similarities and differences between science and religion, framed as epistemology of science and faith (e.g., methodologies in social sciences and theology) as well as anthropology of science and theology (e.g., philosophical and cultural notions of “science,” and history of natural sciences).
- Applied understanding of how science and religion can complement each other in selected areas such as medicine and bioethics, climate change and environmental ethics, gender issues, and the medical and spiritual sides of addiction.

- Literacy in science and philosophy, including a general knowledge of specific fields (e.g., astrophysics, and evolutionary biology) and familiarity with the state of technological developments (e.g., in medical technology).
- Direct preparation for pastoral ministry to scientists and those working in scientific fields.

The biggest challenges (or needs) that the rectors say they face in preparing seminarians to evangelize in a world that is shaped to a considerable extent by science and technology can be organized into four areas:

TABLE 1. PERCENTAGE OF COHORTS EDUCATED UNDER CURRENT

	Rector Theologate (n=26)			Director of Spiritual Life (n=27)		
	College (n=16) %	Theologate (n=26) %	Altogether (n=42) %	College (n=18) %	Theologate (n=27) %	Altogether (n=45) %
<1 (started after 2014)	33	22	27	38	42	40
1 (started in 2014)	23	19	20	19	12	14
2 (started in 2013)	0	4	2	0	8	5
3 (started in 2012)	11	30	22	13	12	12
4 (started in 2011)	17	7	11	13	0	5
5 (started in 2010)	11	4	7	6	0	2
>5 (started before 2010)	6	15	11	13	27	22
Altogether	100	100	100	100	100	100

TABLE 2. PERCENTAGE OF SEMINARY RECTORS WHO CONSIDER THE FOLLOWING “VERY IMPORTANT” IN SEMINARIES

	IN THE U.S.			ABROAD
	College (n=17) %	Theologate (n=31) %	Altogether (n=48) %	Altogether (n=7) %
Human sexuality	77	82	81	71
Euthanasia	53	68	67	43
Stem cell research	35	42	44	14
Genetic engineering	29	40	40	14
Scientific method	41	26	33	14
Darwinism	24	21	25	0
Internet technologies	47	19	30	14
Climate change	6	16	15	0
Behaviorism	12	14	13	14
Psychology of religion	12	11	13	43
Sociology of religion	18	11	11	29
Artificial intelligence	6	8	9	0

- Needs for more guidance from the Church including resources from theologians providing specific responses to rapid advances in science and technology, support from bishops and superiors as well as revisions to the *Program of Priestly Formation*. The problems with *Program of Priestly Formation* include the *Program* not addressing the topic, M.Div. requirements leaving little room to give more attention to the topic, and the orthodox focus of the curriculum impeding the teaching of research skills.
- Needs for better preparation of the faculty. Good preparation requires faculty to be familiar with rapid scientific developments and their complicated implications on an ongoing basis.
- Needs for better general preparation of the seminarians, which first and foremost should focus on faith formation grounded in the Gospel and Church (i.e., seminarians “don’t need to be scientists, but rather evangelists” and they need to “have a well-developed and healthy relationship with Christ”). However, seminarians would benefit from proper education on theology and science in one vision while properly keeping the two distinct. The seminarians would also benefit from training to be conversant in select areas, so they can critically and theologically address the issues arising from advances in science and technology. Some rectors see a need for more standardized and better science

education on college level—this education could help address the tendency of some seminarians to focus on liberal arts and to dismiss “hard” sciences as less relevant to their ministry.

- Challenges after graduating include preparing the seminarians for conducting discourse about religion and science in the context of increasing politicization of science in many areas (e.g., climate change); communicating a more nuanced message (i.e., avoiding the too easy integration of faith and science and at the same time avoiding the divorce of faith and science); remaining up-to-date with scientific discoveries and technological developments; navigating the tendency of the general population to blindly trust in science and to be critical of religion; “scientific atheism;” as well as navigating the tendency of the general population toward scientific materialism and relativism.

“I think the biggest challenge is presenting the Gospel and its teachings and implications in a manner that is credible of an increasingly well-educated and critical body of Catholic faithful.” —RECTOR OF A U.S. MAJOR SEMINARY

“There is a real need to explore the significance of scientific methodology and findings to the practice of theology and pastoral ministry. So much energy has been applied to the apologetics exercise of trying to “defend” theology from the attacks of atheists (who often claim to use scientific reasoning), or to exposing the false claim that science has no need for a religious/metaphysical grounding, that we are neglecting the rich contribution that science can provide to the practice of theology.” —RECTOR OF A U.S. MAJOR SEMINARY

FACULTY

While rectors’ opinions play a role in shaping the curriculum and extracurricular activities, it is the faculty that has the most direct influence on the formation of seminarians. In the United States, theologates tend to be bigger than college seminaries but maintain a similar ratio of students per full-time faculty member. On average, there are 65 seminarians per Catholic major seminary (40 seminarians per college seminary and 80 per theologate). On the other side, there are eight full time clergy faculty and six full time lay faculty per major seminary. Both kinds of major seminaries maintain on average a similar ratio of students per full time faculty member (5.0 seminarians per teacher in college seminary and 4.7 in theologate).

College seminaries have more faculty with a background in science than theologates. On average, there are two faculty members with a background in science per major seminary. On average, there are two clergy faculty members and three lay faculty members with background in science per college seminary as compared to one and less-than-one, respectively, per theologate.

TABLE 3. FACULTY’S EXPERIENCE IN SCIENCE AND RELIGION

	Theologate %	College Seminary %
Faculty with background in science	9	63
Seminaries with faculty conducting research or writing on religion and science	77	44

Faculty members in two out of three major seminaries (65 percent) are currently conducting research or writing on the intersection of religion and science. Faculty in theologates are 33 percentage points more likely to be productive in this area than those in college seminaries, even though faculty in theologates are about 54 percentage points less likely to have background in science than those in college seminaries. This can be partially explained by differences in the subjects of studies prepared in the two kinds of institutions. Namely, faculty in theologates are 31 percentage points less likely than those in college seminaries to conduct research and writing in natural sciences which require relatively strong background in science. Conversely faculty in theologates are 42 percentage points more likely than those in college seminaries to conduct research and writing on history of science and theology.

Overall, faculty in theologates conduct research or writing on a wider range of issues pertaining to religion and science than faculty in college seminaries. The subjects of studies prepared by college seminaries’ faculty include: bioethics, cosmos and creation, faith and reason, gender differences, and ontology. The subjects of studies prepared by theologates’ faculty include: bioethics and medical ethics, gender differences, evolution and theology, ontology, cosmos and creation, history of science, biology of Spirit, climate change and ecology, anthropology, epistemology in theology and science, as well as neuroscience.

FORMATION

“The Church has no wish to hold back the marvellous progress of science. On the contrary, she rejoices and even delights in acknowledging the enormous potential that God has given to the human mind.” —POPE FRANCIS (2013, §243)

Three in four U.S. major seminaries (76 percent) offer course(s) in their program that integrate science and religion (theologates are 30 percentage points more likely to offer those courses than college seminaries). Three in five (62 percent) major seminaries offer courses engaging the bigger questions of science as a part of core courses and 70 percent as optional courses. Three in five seminaries (58 percent) include Pope Francis’ encyclical *Laudato Si* in their current curriculum (theologates are 45 percentage points more likely than college seminaries to include the encyclical).

TABLE 4. SEMINARIES OFFERING OPPORTUNITIES TO LEARN ABOUT SCIENCE AND RELIGION

	College %	Theologate %	All %
Optional courses	63	74	70
Core curriculum	63	61	62
Extracurricular	47	48	48
Symposia*	37	32	34
Workshops*	16	23	20
Lectures*	55	61	58

* an event(s) was held in the last two years

Half (48 percent) of major seminaries held extracurricular activities on religion and science in the last two years. One in three major seminaries (34 percent) held a symposium(a) in the past two years that explicitly explored science and religion. College seminaries were five percentage points more likely than theologates to organize such a symposium. One in five major seminaries (20 percent) report that their seminary held a workshop in the past two years that explicitly

TABLE 5. PERCENTAGE OF SEMINARIES INCLUDING THE FOLLOWING IN THEIR PROGRAMS

	College %	IN THE U.S. Theology %	Altogether %	ABROAD Altogether %
Epistemology	79	87	84	63
Bioethics	47	84	70	25
Ontology	58	77	70	63
Historical theology	42	84	68	25
Social sciences	63	65	64	0
Cosmology	47	65	58	50
Natural sciences	63	32	44	0
Applied ethics in science (other than bioethics)	32	42	38	50

addressed some aspect of the topic of science and religion. Theologates were seven percentage points more likely than college seminaries to organize such workshops. Three in five major seminaries (58 percent) invited a lecturer who explicitly addressed some aspect of the topic of science and religion. Half of those guests (48 percent) had background in science, scholarship, and/or academia while one in three (34 percent) was a religious/church leader. Theologates were eight percentage points more likely than college seminaries to hold such lectures.

In most major seminaries (95 percent), the issues or topics discussed in the symposia or workshops did not cause disagreement or controversy. All the reports of disagreement or controversy came from theologates and, among other things, pertained to bio evolution and Aristotelian philosophy, and attributed the arguments to incompetent speakers.

OTHER COUNTRIES

The findings from Australia, Canada, Ireland, and South Africa while limited (since they are based on a convenience sample and characterized by a low response rate), indicate similarities in the attitudes of the rectors in those four countries to the rectors in the United States. However, the American rectors appeared more likely to act upon those attitudes.

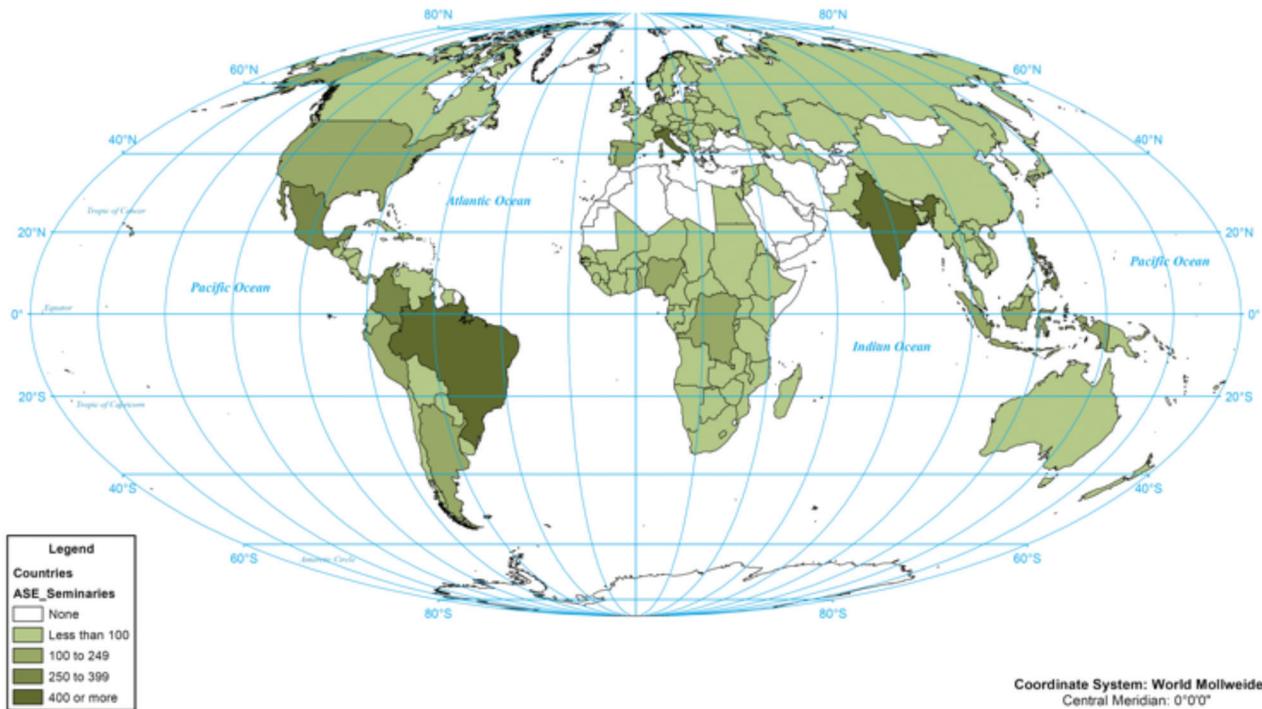
Rectors in the four English-speaking countries shared some similar opinions to the rectors in the United States regarding the relative importance of seminarians’ understanding of the various topics to their preparation to evangelize in a scientific and technological world. Both groups were most likely to rank human sexuality and euthanasia to be “very important” while artificial intelligence was least likely to be ranked that highly.

In comparison to the U.S. major seminaries., responding seminaries in the four English-speaking countries were less likely to include any of the seven areas of study related to science and religion in their program, starting with social science (64 percentage points less likely to be included), and followed by bioethics (45 percentage points), natural sciences (44 percentage points), historical theology (43 percentage points), epistemology (21 percentage points), cosmology (8 percentage points), and ontology (7 percentage points). On the other hand, responding seminaries in the four English-speaking countries were 12 percentage points more likely to include applied ethics in science (other than bioethics) in their program.

“The best way to evangelize is to dialogue with the modern world.”

—RECTOR OF A MAJOR SEMINARY IN CANADA

FIGURE 2. CONCENTRATION OF CATHOLIC SEMINARIES AROUND THE WORLD



Although the results presented here do not allow for general conclusions about the role of science in seminarians' formation outside the United States, recent research indicates that seminary education is changing around the world. According to Kramarek, Gaunt, and Sordo-Palacios (2017), the number of seminaries seems to have grown significantly over the last century. Currently, only one in five seminaries is located in Europe and North America. Countries with the most seminaries are India (1,096 seminaries), Brazil (1,010 seminaries), and Italy (407 seminaries). The map displayed here, based on Segreteria di Stato Vaticano (2013), shows the concentration of Catholic seminaries around the world.² The median number of seminaries is 12 and the average is 48 per country for all countries where a seminary has been identified. Only one in five seminaries (20 percent) is located in Europe (16 percent) and North America (four percent). By comparison, 29 percent of seminaries are located in Asia and Oceania, 27 percent in South America, and 16 percent

in Africa. The growth of the Catholic Church in the global south is seen by a larger number of seminaries in the Democratic Republic of Congo (159) than in Poland (90), a larger number in India (1,096) than in Italy (407), a larger number in Columbia (277) than in the United States (243).

As the Catholic population continues to grow in the countries of the global south, the foundation of new seminaries will likely follow. Current data indicates a strong, positive correlation between the size of the Catholic population in a country and the number of diocesan philosophy and theology seminaries. Industrialization in those developing countries will likely affect public attitudes towards science and religion. In this context, assessing attitudes of seminary rectors on the current state of seminary preparation at the intersection of science and religion in the global south could become of increasing importance to the Church.

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About CARA

CARA is an independent, national, non-profit, Georgetown University-affiliated research center that has more than 50 years of experience conducting social scientific studies about the Catholic Church. Founded in 1964, CARA has three major dimensions to its mission:

1. to increase the Church's self-understanding
2. to serve the applied research needs of Church decision-makers
3. to advance scholarly research on religion, particularly Catholicism

The CARA staff is composed of professionally trained academic social scientists who have earned graduate degrees. CARA's long-standing policy is to be independent and objective, to let research findings stand on their own, and never take an advocacy position or go into areas outside its social science competence.

NOTES

1. For more insights on this topic see the CARA Special Report on Catholics' Opinions about Faith vs. Science.
2. The underlying data covers 95 percent of all ecclesiastical jurisdictions around the world. The data used here is a sum of all seminaries and residences, seminaries for diocesan priests and religious priests, secondary school programs as well as philosophy and theology programs. Thus, the number of seminaries here tends to be higher than the number of seminaries-institutions in each country. It should be also noted that the map combines Taiwan, Hong Kong, Macao, and Mainland China (the number of seminaries in Mainland China is not available).

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