

I. The state of science in seminaries accredited by The Association of Theological Schools (ATS)

a. Introducing the study

There is a widespread cultural perception that science and religion are at odds. Consequently, one might expect that the institutions that train Christian leaders in North America would have a tenuous relationship, if any at all, with science. Of course, anyone who knows a bit about these seminaries knows this is not necessarily the case. But how much do ATS-affiliated seminaries engage with science? Do faculty incorporate science in their teaching? Or in their research? If so, how frequently and with what types of science do they typically engage? Are seminaries training future religious leaders who are able to engage science and to negotiate the complexity that exists at the intersection of faith and science?

These are some of the questions ATS set out to answer with a 2015 grant from the [John Templeton Foundation](#). The purpose of studying science engagement in seminaries was two-fold: first, to create a baseline for the level of science engagement within North American Protestant seminaries that can be used to assess the impact of the [Science for Seminaries](#) program run by the Dialogue on Science, Ethics, and Religion (DoSER) at the American Association for the Advancement of Science (AAAS) in collaboration with the ATS; and second, to obtain insights that can improve the efforts of Science for Seminaries and related programs seeking to increase science engagement in the formation of religious leaders as well as in theological scholarship. This report will summarize key findings from three phases of this research: a quantitative survey of 739 seminary faculty representing 186 Protestant member seminaries; qualitative interviews—40–75 minutes in duration—with key informants from 29 representative Protestant seminaries; and analysis of course syllabi, public lectures, collaborations and partnerships, and the websites of 28 representative seminaries.¹

b. The author of this resource paper

Drew Rick-Miller is the former director of religious engagement at the John Templeton Foundation where, until the end of 2016, he developed and managed programs working with religious media, religious institutions, and religious audiences. His portfolio of grants at Templeton included the Science for Seminaries project along with multiple other programs with seminaries in North America and beyond. Seminary trained—with an MDiv from Princeton Theological Seminary—and the spouse of a Presbyterian Church (USA) pastor, Rick-Miller is a specialist in religion and science, with particular interest and more than 15 years of experience engaging scholars and religious audiences on faith and science. This resource paper brings to bear experience, insights, and perspectives above and beyond the quantitative and qualitative data collected by separate consultants hired by ATS.

II. What have we learned

¹ Note that the representative sample of 29 seminary informants and 28 seminary syllabi, lectures, collaborations, and websites included seven of the Protestant seminaries participating in the Science for Seminaries project as well as a mixture of non-participating seminaries from different ecclesial families, differing sizes and contexts, and differing levels of science engagement.

This section includes a number of findings we can state with reasonable confidence following this study about engagement with science in North American seminaries. The mixed methods approach of the study corroborates external evidence, and so we accept the following conclusions with a high degree of certainty.

a. Science is valued, but it is not clear that we agree on what counts as science

Three-quarters of faculty surveyed engage science frequently (14%), regularly (25%), or occasionally (37%) in their teaching, and more than half incorporate science into their scholarship. Importantly, they feel that their institutions support engagement with science—74 percent agree that teaching that engages science is supported, and 71 percent agree that engaging science in scholarship is supported. Nearly half have read a popular science magazine in the past month, and nearly a quarter have read a peer-reviewed scientific journal. Science is not something that is being ignored or avoided in North American Protestant seminaries.

Key informants supported these findings from the faculty survey, with a significant number identifying science as one of the top three issues for theological education in preparing 21st-century church leaders.² An informant from a mid-sized evangelical seminary³ stated, “We live in a time when natural science, social science, engineering, and technology are among the primal shapers of our civilization.” Another informant from a small mainline seminary added, “We have a generation that is both technologically and scientifically informed, but we have a church and a theological world that has largely treated these as irrelevant, focusing on spirituality [and] on other issues. I think that gap is probably the biggest issue facing seminaries.”

What is less clear is how faculty define science. As you will see next, a wide range of sciences are engaged—at varying levels of interest—but a closer review of the syllabi collected and evaluated suggests that science means different things for different scholars. This includes science and religion scholarship (much of which is done by theologians and philosophers), closely related work in the philosophy of science, appropriations of science by practical theologians, archaeological or sociological work done by historians or biblical scholars, ethnographic research done by humanities scholars, and some creation science or intelligent-design research. In about 15 percent of the 421 syllabi for courses engaging science that were given to ATS, there is no obvious evidence of any engagement with science, which suggests some disconnect on what constitutes science from those seminary representatives collecting the science-engaged course syllabi. That is to say that, while there is interest and engagement with science, it varies widely in the type of science, and much of it is coming from theologians, philosophers, and related scholars rather than from professional scientists, for example, via peer-reviewed science articles or from popular lectures or writings by professional scientists.

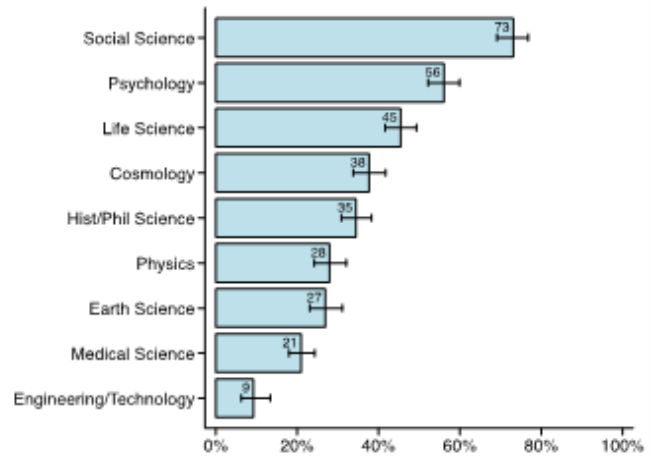
² The other issues most frequently identified were social justice (racism, sexism, and sexual identity) and self-care (of clergy and congregational life).

³ Unless explicitly stated, all informants quoted represent seminaries that did not participate in the AAAS Science for Seminaries project.

b. Human and social sciences are preferred

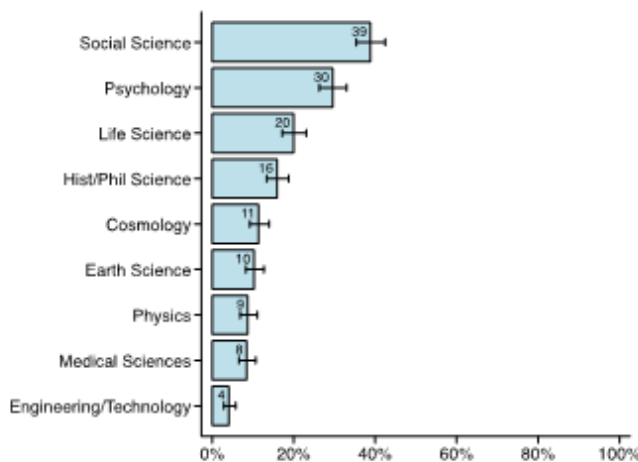
In all aspects of this evaluation of science engagement in seminaries, there emerged a consistent hierarchy in terms of which sciences are most commonly engaged. At the top of the list are social science and psychology, and at the bottom of the list are engineering/technology and medical science, with the natural sciences (life science, cosmology, physics, and earth science) and history/philosophy of science somewhere in between. **Figure 1** shows the breakdown for classroom science engagement, and **Figure 2** shows the breakdown for engagement in research. The pattern is very similar for what sciences faculty are most interested in and for how well prepared faculty feel to teach these areas of science.⁴

Figure 1. Field used in classroom science engagement (all faculty who report using science in classroom)



Source: Engaging Science in Seminaries Survey, 2016

Figure 2. Scientific field used in faculty scholarship (all faculty)



Source: Engaging Science in Seminaries Survey, 2016

These findings corroborate results from the evaluation of course syllabi. Almost half of the courses cited engage the soft sciences (psychology and the social sciences); whereas, only 28 percent engage the hard sciences (physics, biology, earth science, medical science). A number of informants across different types of seminaries confirmed this finding, indicating that the sciences linked to pastoral practices like counseling are more prevalent than are the natural sciences.

c. Faculty are key

This came out most clearly from the informants, but overall the study suggests that the key levers for engaging science in seminaries are the faculty. They serve as both the promoters and the barriers. They feel largely supported by their institutions to engage science both in the classroom and in research. They also have significant freedom in both domains to design courses⁵ and set

⁴ Interestingly, faculty feel more prepared to teach engineering/technology subjects, ahead of the natural science areas, even though engineering/technology was at the bottom of all the lists regarding classroom and research engagement as well as personal interest.

⁵ While faculty have freedom in designing courses, ATS provides standards for various degree programs. In fact, the MDiv program, according to standards A.2.3.1, shall not only account for the cultural context “within which the church lives and carries out its mission” (p. 2 of 48, Commission of Accrediting, Degree Program Standards) but

their research priorities and, therefore, can choose against competing interests whether or not to engage science. Based on observations outside this survey, including the Science for Seminaries program, this seems to be the case in actual practice—faculty drove most applications to the program based primarily on their own interest and initiative rather than as a response to seminary administrators requesting or requiring that they do so.

Importantly, there are faculty with backgrounds in science who often lead seminary engagement with science. Approximately half of the informants could name at least two faculty at their institutions with degrees or previous careers in science or engineering. This corroborates survey results that found about 15 percent of the sample of 739 seminary faculty had graduate training in science. Not surprisingly, these individuals reported higher-than-average engagement with science and were represented by a number of the seminary informants and instructors in the collected course syllabi.

d. Traditional variables matter little

Three factors were reported to impact classroom engagement with science more than any other. The first two make sense: graduate training in science by the faculty member leads to increased engagement, and holding a Young Earth creationist perspective leads to less. Interestingly, the number of degree programs offered by the seminary also has an impact (more than average).⁶ Traditional distinctions such as the school’s ecclesial family or location (United States or Canada), seminary size, whether the seminary is freestanding or embedded, the theological orientation of faculty, faculty gender and race, and student gender and race do not make a significant difference.⁷

e. Theological discipline matters

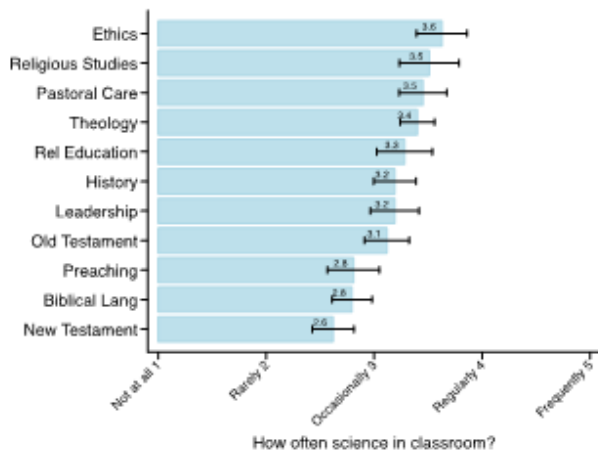
Applied and interdisciplinary theological subjects generally align with greater science engagement in the classroom. Faculty teaching subjects like ethics, religious studies, and pastoral care all scored higher in science engagement; whereas, those teaching preaching, biblical languages, and New Testament scored lower. See **Figure 3** for a full breakdown.

“should draw on the insights of the arts and humanities, the natural sciences, and the social sciences” (Ibid., p. 3 of 48).

⁶ See pages 2–3, Hill and Gin, “Engaging Science in Seminaries: A View from Faculty” for more discussion of this finding. In short, it is not clear why the number of degree programs positively impacts science engagement in the seminary classroom.

⁷ This is based on the quantitative study. There may be conflictual findings with the analysis of syllabi, which suggest that larger seminaries, especially those embedded in a research university, are more likely to have heavy engagement with science (more than seven mentions of science in a particular course syllabus). Similarly, those seminaries embedded in research universities are also more likely to engage the hard sciences. It is unclear whether this finding is the result of a small sample size—the analysis of syllabi only included 29 seminaries, of which three were embedded in a research university—or if there really is a difference here. In the survey, we invited randomly selected faculty and asked them individually to respond to questions about their own engagement. In the document analysis, we looked at the school’s overall engagement, as seen through syllabi. So randomly selected faculty at research institutions may not engage science differently from randomly selected faculty at non-research institutions, but, overall, engagement might differ based on the research status of the institution. A more thorough investigation is needed to assess if there is, indeed, a difference among seminaries embedded in research universities.

Figure 3. Classroom science engagement by area of faculty expertise (all faculty)



Source: Engaging Science in Seminaries Survey, 2016

Also, certain topics seem to attract more interest than others—or at least more faculty feel a need to address them with students due to perceived conflicts. Not surprisingly, creation/evolution topped the list by a large margin (48 percent of faculty reported it as a perceived area of controversy among students, the only topic above 20 percent). Psych/neuroscience; age of the earth/universe; social science/cultural studies; and gender/sexuality all came in at 18–20 percent. Somewhat surprisingly, climate change/environment was only referenced by eight percent of respondents, which likely implies a lack of controversy rather than a lack of perceived importance.

f. Best practices include use of scientists/science partners

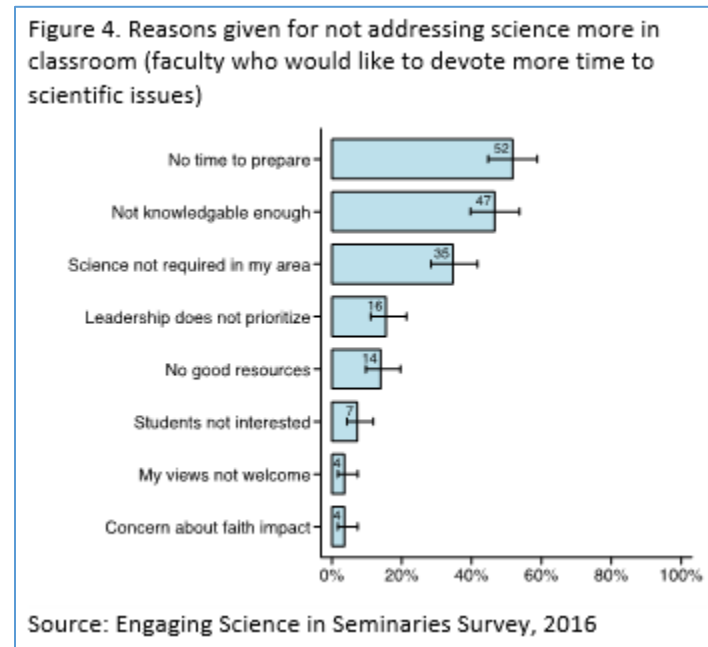
Interviews with key seminary informants identified that faculty with science backgrounds and guest scientists (often with no theological training) were the most effective means of incorporating science into seminary education. One informant from a very large evangelical seminary commented, “We think the strongest point is team teaching and bringing in scientific specialists who can actually discuss the scientific issues directly rather than just talking about how we theologians think about the science.” This was a point of emphasis in the Science for Seminaries program, which provided both networks of scientists and financial resources to compensate scientists for their involvement. That program also created [a series of video resources](#) with leading scientists discussing theologically relevant scientific topics.

g. More is needed, students are not equipped

When asked, 69 percent of faculty reported that they are happy with the amount of time dedicated to science in the classroom. Most of the rest (27 percent) would like to see more done. However, they cited a lack of time, a lack of knowledge, and a disconnect between science and their areas of expertise as the main reasons for not doing more. At first glance, this suggests that most faculty are doing the right amount, but, when asked, 52 percent indicated that their seminaries could be doing more to engage scientific issues. Similarly, the key informants suggested a need for more. They did this by identifying hindrances —ambivalence by some colleagues; lack of time, knowledge, or resources to do more; the need for funding and other incentives—and motivations, mostly a sense of how important this work is to the church. Most significantly, the 739 faculty in the survey indicated that only one in five believe that their seminary students are “well prepared” to engage with science in their various ministries after completing their seminary training. Activity is happening and—according to more than two-thirds of the faculty—sufficient activity. Given the many demands and pressures on the seminary curriculum, however, faculty suggested that not enough is being done to prepare students to minister to a culture that is steeped in science and technology.

h. Barriers are time and knowledge (and, perhaps, prioritization), not theological concerns

Going into the study, there was some expectation that theological perspectives would be a major factor influencing engagement with science. Whether indifference or resistance toward science, there would be pressures of orthodoxy or other theological priorities like missions or justice



steering seminaries away from science toward many other important topics. As noted earlier, respondents reported that engagement levels are not impacted by theological perspective—either progressive, moderate, or conservative. Similarly, concerns over how science might impact students’ faith or concerns that one’s views toward science are not welcome at the seminary ranked at the bottom of the list of reasons faculty cited for not devoting more time to science. Time to prepare and knowledge of science are the primary factors here, along with a sense that science is not required for certain theological areas. See **Figure 4** for a breakdown of reasons given for

not addressing science more in the classroom.

While this survey indicated that only 16 percent of faculty feel that leadership does not prioritize science, the informant interviews suggested this might be an even larger factor. Not only did they echo many of the reasons found in Figure 4, but one informant from a very large evangelical seminary also stated explicitly, “Curriculum changes . . . can happen pretty simply if you’ve got people on board to say ‘this is something worth pursuing.’” Lack of time to prepare is perhaps only an indicator of where science integration ranks in the list of seminary priorities. If it were a higher priority or if it were incentivized or connected to faculty advancement, more seminary professors would likely find time and pursue the necessary knowledge. Instead, the same faculty who not only are the key drivers of engagement with science but also express a desire to bring more science in the classroom indicated that they lack the time and knowledge to do so.

i. Resources are needed

The study identified both the ways faculty engage science and what is needed to increase engagement. First, faculty prefer what might be called theologically receptive science resources (i.e., resources produced by experts with both scientific and theological facility and ones that are not too laden with technical jargon). Furthermore, they want science content that fits into their pedagogical aims and commitments. Videos, especially short ones of two to three minutes, as well as articles to distribute, interactive websites, and reading lists are among the science resources that most interest faculty. Similarly, the seminary informants noted the importance of scientists and science partners (especially to expose students to science) and the need for funding, like the Science for Seminaries program, which can incentivize science engagement among a wider range of faculty and courses, not just the individuals predisposed to it.

j. The justice implications of science can affect engagement

The need to attend to how engagement with science in seminaries intersects with matters of justice came up in informant interviews. Both from mainline and from evangelical schools, several interviewees shared their concerns for how science is perceived by students from particular communities.

For some African American students, for example, integrating science and religion goes beyond mere doctrinal or theological unease. One informant from a very large evangelical seminary explained, “My African American students, for instance, when I start talking about science, they just shake their heads because, first of all, they usually come from fairly conservative traditional congregations . . . but the other reason is that the black community, in general in the United States, does not perceive science to be their friend. They see the way that science has been used to actually justify their treatment.” An informant from a large mainline institution put it this way, “I’m not sure it’s helpful with all the students in addressing some of their anxieties about evolution. I think—just to be very frank about it—I think some of the African American students are particularly sensitized on this point because they know how these things have been spun in the past. They’re apprehensive about a white guy theologian standing here talking in positive terms about evolution.”

Similar discomfort among international students was noted by an informant from yet another very large evangelical seminary: “I suspect that some of our students, especially who are coming from overseas or from outside of the United States and Europe, are a little less comfortable with a full-bodied integration with science . . . Part of that reflects the diversity of our student body, and our students from Africa and East Asia and Latin America often are a little bit more wary, more cautious on these things.”

Given the steadily increasing enrollments of seminarians of color in ATS schools,⁸ attending to the complex intersection between justice and approaches to the integration of science and theology will be important for future interventions. In particular, future work would do well to incorporate approaches that explicitly address sociopolitical histories of racialized communities in the United States and the roles science has played in these histories.

III. What requires further investigation

The following items are those areas that were investigated during the study but about which more research is necessary due to limitations in methods, small sample sizes, and/or ambiguous results.

⁸ Some estimates of ATS enrollment data suggest students of color will represent a numeric majority by 2025. As of 2015, 25 percent of ATS schools were majority non-white. (See Tanner, “Seminaries set six enrollment records,” *Colloquy Online*, February 20, 2015.)

a. Student receptivity—generally positive?

Do the students respond positively in classes where science is engaged? One weakness of this study was that all data were collected from seminary faculty, administrators, or publicly accessible materials online. While we attempted to discern student interest and receptivity regarding science, that information was collected secondhand, mainly via faculty. Faculty did estimate that 15 percent of students have natural science degrees and a larger 28 percent have degrees in the social sciences. But they estimated that the majority of the students (59%) do not have a science degree. Additionally, 71 percent of faculty who teach on scientific topics in the classroom reported that students are interested in science topics, but no more or less so than in any other topic. A further 11 percent reported that students are less interested in science and the remaining 18 percent, that they are more interested in science.

The seminary informants recounted positive reactions, some formal and some informal, to engaging science in seminary courses among their students. There are anecdotes like this one from an interviewee of an evangelical seminary that participated in the Science for Seminaries project: “100 percent positive response from students. They said it was the most appreciated part of the whole course.” Another informant also from an evangelical seminary added, “It comes as a bit of a surprise, but a positive one for most.” These same evangelical informants also described students’ initial suspicions regarding science but also observed that, by engaging it in courses, students “learned to be more comfortable with being positive about science and not thinking that science is just something dangerous to our faith.” However, another evangelical informant suggested a more nuanced view: “Some are quite open to it. Others are quite open to it until you start to put two and two together. That is when they are helped to see how it is that some scientific ways of thinking present whole new ways or different ways or challenging ways to think about—or seem to challenge directly—categories of Christian theology, then you get resistance.” Mainline informants generally were positive. Here is one representative comment from an interview of a mainline seminary involved in the Science for Seminaries project: “I would say the response has been almost universally positive. I would say it ranges from...[those] who were just incredibly enthusiastic...that would make up the large majority. Then, there are a few who felt, I think, that [science] was not their priority; not their cup of tea.”

So while there appears to be general enthusiasm, these informants themselves are generally interested and positive toward science—and they may be overly representing the favorable segments of their seminary’s student population. More work, ideally work that surveys students directly, is needed before we can say that the response of students to science in seminaries is, indeed, a positive one.

b. Quality of science

What is the quality of engagement with science among North American seminaries? As noted earlier, there is a wide range of science that is being engaged in seminaries, and, while this study was far from conclusive, there are reasons to suggest the quality is also varied. We assume that theology should engage with science of the highest quality, the kind of science that would be recognized as quality by the scientific community. Why such a high bar? Following the lead of both the Science for Seminaries program and the John Templeton Foundation, our primary evaluation criterion is whether peer-reviewed science is engaged that meets the expectations for quality held by the relevant scientific guilds. This high bar may or may not be held by seminary

faculty, but it was the standard we applied to the science materials and science engagement in seminars, especially among the 400+ collected course syllabi.

One indicator of quality is involvement by active science professionals in seminary teaching and research. These experts know the nuances of their fields, something that is rarely obvious to non-experts. They know the debates over various interpretations and the full range of relevant experimental work. There were a few excellent examples within collected course syllabi that included direct participation by science experts, but the quantitative survey did not give a sense of how widespread this practice is among North American seminaries.

Implicit in the use of science professionals is improved access to the state of the art within a given field. Syllabi include some established findings in science that are decades old, but many fields move forward with new developments—some very subtle—that happen in real time. Hence, engagement with science from past decades, without guidance from experts, runs the risk of engaging with outdated findings. In the 400+ syllabi collected, most of the science content appears to be from texts, resources, or publications from the last five to 15 years, but it will be important for faculty to regularly update syllabi to stay up-to-date with scientific developments. An excellent science-and-religion resource for today may be outdated in five years. Assessing how often instructors update their science resources was not something revealed in the study.

As noted earlier, seminary faculty prefer science resources that are theologically receptive. The most common science content found in the syllabi are what I would call secondhand science—that is, science engaged through the scholarship of a theology or philosophy scholar. As such, it includes an added layer of interpretation from the original scientific work. Much of that work meets a high standard—two of the most common names in the syllabi are John Polkinghorne and Alister McGrath, who have terminal degrees in science along with research experience prior to their pursuits of theology. However, it would take a pool of science experts to review all of the secondhand literature found in the syllabi to ensure that all of the work is of the highest quality according to the standards of the relevant scientific disciplines. In fact, a longstanding critique of science-and-religion scholarship is that humanities scholars tend to cherry-pick scientific findings (or interpretations of evidence) that bolster their theological presuppositions. This is where some discrimination from experts in the sciences would be helpful.

A few courses include actual scientific work conducted by seminary faculty. In such instances, once again, the science should be of the quality expected of peer-reviewed journals in the relevant scientific disciplines. For example, does the biblical archaeology that Bible scholars are using meet the empirical standards of the *Journal of Archeological Science* or *Antiquity*? This remains unclear, as syllabi analyzed in the study did not include this kind of information.

Finally, there is some evidence of engagement with creation science or intelligent-design research, two topics that **have not been** received favorably by nearly all scientists, even including many who themselves would self-identify as favorably disposed to religion. Perhaps as important, it would not be convincing to many, perhaps most, of the persons who increasingly disaffiliate with religious communities, a growing audience many seminary graduates hope to reach.

In summary, the quality of science engagement seems quite good but with some room to improve. It is also important to always remain vigilant regarding the quality of science being engaged in seminary curriculum and faculty research. There are a good number of exemplars using peer-reviewed science, active scientific researchers, and, most often, the modest pool of theologians and philosophers who have relevant scientific expertise. This meets the recommendations of multiple informants: there is great value in leveraging science-trained seminary faculty and in bringing scientists into the classroom, either team-teaching or via visiting lectures. As such, the ideal for both teaching and research may be to leave the communicating of the science to the scientists as much as possible, including even scientists who are not themselves religious.⁹ Importantly, one somewhat surprising lesson from the Science for Seminaries project is that scientists almost always agreed to participate in the project when asked. This was a great aide to participating seminaries as they sought to engage with the highest quality science.

c. Depth of reach amongst students

Over a decade ago, the John Templeton Foundation supported a program providing small awards for science and religion courses that included a number of North American seminaries, some of which continue to be taught. A good number of these courses were electives that reached only a small fragment of the overall seminary student population. Consequently, an important question for this study was: how widely are students being exposed to science within the seminary curriculum? Is it merely happening in electives, or are there examples that reach entire cohorts of students within particular degree programs?

The Science for Seminaries program required grant recipients to engage science in required courses even if it only involved a module or two within a larger course. (An example might be in a lecture on Genesis 1 and another on the creation Psalms in an Old Testament survey course.) The review of course syllabi revealed that a little more than 50 percent of the courses analyzed are offered at least once a year.¹⁰ A similar proportion (53%) are required for one of the degrees offered by the seminary, including 34 percent for an MDiv, 14 percent for a professional master's, 17 percent for an academic master's, and six percent for a DMin or PhD.¹¹

Along with the data that suggest that 69 percent of faculty believe they are addressing the right amount of science in their courses, it might appear that students are getting enough exposure to science throughout their seminary degrees. However, when only one in five faculty believe their students are equipped to engage science upon graduation, there is clearly something more needed. Here is another instance where direct student input would be helpful—it may be that more is needed in seminary, or this could be an instance where the introduction occurs in seminary and the more that needs to happen is left for continuing education programs or resources like books, websites, and other materials created for use in various ministry contexts. If

⁹ The [DoSER science videos](#) mentioned previously may be a resource here.

¹⁰ Results showed that 43 percent of courses are offered annually; 14 percent are offered more than once per year; 22 percent are offered every two to three years; four percent are offered every three to seven years; 14 percent were one-time offerings; and the final four percent do not fit neatly in any of these categories (i.e., special course, new course, or the frequency varies).

¹¹ About 14 percent of courses are required for more than one degree program, all of which are combinations of an academic master's, a professional master's, and an MDiv. As a result, the totals exceed 53 percent.

there is a desire to see a higher percentage of students equipped to engage science in their post-seminary vocations, more work is needed to understand if the engagement with science is adequately reaching seminary student populations.

d. How science is applied in theological education

We have spent some time discussing the variety of science and the quality of science used in seminaries, but an equally interesting question is how science is used. Clearly, the goal is not to prepare students to do peer-reviewed scientific research. But even with a more modest goal, using the phases of water as an analogy for the Trinity is very different from an archaeological dig searching out new manuscripts, which is very different than applying the five stages of forgiveness to spiritual formation. Based on findings from the multiple phases of this study, there are a number of options to classify how science is applied in North American seminaries.

The analysis of curricula suggested the following distinction:

- Sixty-two percent of science-engaged syllabi represent ***religion and science in dialogue***, where science is a conversation partner to theology. Whether it is readings, weekly subject matter, or writing assignments, science is informing students' theological imagination rather than their behaviors or practices.
- Twenty-four percent of science-engaged syllabi represent what you might call ***faith using science***. This is when science is being used to shape practice and ministry as well as when science research—archaeology or ethnography—is used to obtain new knowledge relevant to theological belief or practice.

Analysis of the interviews with informants came up with other categories including care of life,¹² what one informant described as “just facts that they use,”¹³ and a conflict vs. dialogue framework.¹⁴

I would like to offer a somewhat different framework. These areas could be applied to theology or ministry in multiple ways—some apologetic, some to improve actual ministry practices, some to sharpen theological doctrine, some to illuminate Scripture, and some as metaphors or analogies to gain perspective on theological concepts. Similarly, each of these categories might include science content that appears to confirm or conflict with one's theological concerns, and, in other cases, the science might be completely indifferent to one's beliefs. Nonetheless, I

¹² Care of life was understood to include creation care themes, neuroscience/medicine/psychology themes (care of persons, primarily), and even some technology themes. There seemed to be a sense of health and flourishing as well as stewardship in how this phrase was used.

¹³ “Just facts that they use” is the way another informant referred to science use in his seminary. By this, he was referring to a cursory use of scientific evidence, for example climate change as a reason why the Israelites moved into the Levant; or how counseling faculty might use various psychological scales or diagnostic tools; or how ministry classes might use group theories or Maslow's motivational theory. He seemed to be suggesting something deeper was preferable, not just using science to “prop up theories that are already dominant in their Christian theological outlook” but investigating the nature of science (perhaps in comparison to theology) or considering how science may accord or discord with theological concepts or outlooks.

¹⁴ Conflict vs. dialogue was another framework raised by informants. In this framework, science engagement either is about overcoming points of apparent (or actual) conflict or is more of a dialogue partner (similar to our discussion of religion and science in dialogue above).

believe they summarize nicely many of the areas of science and how those distinct areas are used in seminary courses.

1. ***Scientific study of religion***: one way science is used in several courses is to bring to bear scientific research on topics of interest to theology and ministry (for example, scientific research on prayer, conversion, forgiveness, spiritual development, religious cognition, or religious demographics).
2. ***The science of us***: a second way science is used is to better understand who we are as humans, how we might be unique, how to understand gender/race/sexuality, and more applied knowledge about how we learn, how we develop, how memory forms, and how behavior and/or beliefs are modified. There would be some overlap here with the scientific study of religion, but this would include more general study of human nature and behavior applied particularly to areas like theological anthropology and practical theology.
3. ***The science of creation***: a third way science is used is to understand questions of origins; the fundamental laws that govern nature (quantum mechanics, relativity, evolution); the past, present, and future of the universe and life; amazing instances within creation that inspire awe or fear or gratitude; and other topics that fall largely in the domain of the natural sciences. Such science content can be used in doctrine, biblical interpretation, and apologetics, to name just a few areas.
4. ***The nature of science***: another feature of many courses is to help students understand both the history of science (especially as it relates to Christianity) and the philosophy of science (including the limits of science). This conveys the limits and proper scope of science, often in conversation with the methods, limits, and scope of theology.
5. ***Science and justice***: finally, a good number of courses bring science to bear on social justice issues of theological concern, including but not limited to race, gender, creation care, sexuality, and a range of bioethical matters. This would overlap with the science of us, but with an emphasis on justice rather than what you might call a self-understanding of homo sapiens.

In other words, there are many ways to categorize how science is used in seminaries—and none are perfectly comprehensive—but I offer the above as one helpful taxonomy. Further evaluation of seminary syllabi and further investigation into how individual faculty understand their engagement with science is necessary to test the validity of this framework.

e. Embedded vs. freestanding

The final matter requiring more investigation is the difference in science engagement between embedded seminaries—both those embedded with research universities and those embedded in liberal arts colleges—and freestanding seminaries. The survey of faculty revealed a negligible difference between these two seminary contexts; whereas, the syllabi analysis suggested that embedded seminaries, especially those linked to a research university, have higher levels of engagement with science in their science-engaged courses as well as more engagement with the natural sciences. More work is needed to understand the differences and to identify best practices for engaging science within these two common contexts for theological education in North America.

IV. Next steps

This section outlines some recommendations for those—faculty, administrators, denominations, donors—who seek to increase science engagement in North American seminaries.

a. Prioritize

While the study revealed a somewhat surprising level of support for engaging science in seminaries and quite strong indicators that this is one of the most pressing cultural issues for training seminarians, it is also fairly evident that increasing the engagement with science within the seminary experience is not a top priority at most seminaries. There are good reasons for this—not the least of which are crowded curricula, many other worthwhile priorities, and, in some instances, reductions in the credit hours required by various degrees. Nonetheless, it is also true that making science engagement a priority will more often than not give faculty the incentive they need to find more time and increase their knowledge of science. The Science for Seminaries program has some simple models for doing so—mainly incorporating scientists into the preparation and implementation of courses—which were validated by this study as effective models.

b. Opportunity for more engagement with additional funding

While prioritization will certainly expand the level of science engagement within theological education, in many cases, funding sources are also needed. It is true that many faculty are engaging science already, a good number want to do more, and informants generally feel there is more to be done at nearly all of the representative seminaries. Coupled with the fact that only one in five faculty members believes students are equipped to engage science in their future ministries, there is not only interest but also a felt need to do a better job engaging science. What is often missing—and multiple informants mentioned this explicitly—is funding to build connections and interaction with scientific communities, to develop faculty, and to help seminaries—from top to bottom—see the importance and relevance and envision ways to ensure students are equipped. Something akin to additional rounds of the Science for Seminaries grant program was mentioned by several informants as the right model and vehicle to leverage this opportunity with funding.

c. Improving quality of science engagement

Another aspect of the need and opportunity is to improve the quality of the science engagement, both in intellectual quality and in pedagogical effectiveness. While the breadth and depth of quality science engagement remains somewhat of an open question, there is sufficient evidence to suggest room for improvement in both areas. In some cases, this would mean more direct engagement with scientists and/or peer-reviewed science; or helping seminary faculty stay informed on the state of the art in the relevant sciences; or even increasing the amount of what you might call “faith-friendly science”¹⁵ resources for use in theological education and research.

¹⁵ By *faith-friendly*, we do not mean to suggest theologians only engage science amenable to their beliefs. Rather, we mean that the science is presented in ways that are not unnecessarily antagonistic—for example, no militant atheist undertones—and that open the door to metaphysical and theological reflection. The science still needs to represent our best empirical research and scientific theorizing, but a faith-friendly discussion of human evolution, for example, might introduce scientific contributions both for and against theological concepts such as *imago dei* rather than discounting the idea of human uniqueness all together.

Another strategy would be to begin to collect best practices and exemplary syllabi in a manner that can be easily shared with theological educators.

d. Need to better understand and equip students

As noted several times, 80 percent of faculty do not believe seminary graduates are equipped to engage science in their work as clergy, theologians, and religious leaders. Furthermore, we have very little insight on student perspectives regarding science engagement during their formal theological training. More work is needed to understand student receptivity and need. At the same time, it seems safe to assume that seminaries need to increase their efforts to prepare students to engage science, as their graduates will be doing ministry in a world saturated by science and technology.

e. More natural sciences in classroom and research

The evidence collected in this study suggests strongly that more attention is needed in engaging with the natural sciences. Engagement with the psychological and social sciences is most widespread, and these areas of science are also the ones with which faculty have the most comfort and capacity. Furthermore, faculty who engage with these human sciences generally feel that more science is not needed.¹⁶ That is less the case regarding the natural sciences, where there appears to be less engagement, comfort, and capacity amongst faculty.

f. Better alums?

In addition to the lack of input from students currently enrolled in seminaries, this study also lacks any perspective by seminary alums. Do graduates of seminaries who do extensive high-quality engagement with the sciences feel better equipped to succeed in ministry? Do they address science themes more in their ministries, and does that improve their connection with certain segments of their communities or the public at large? Does this make any difference whatsoever on their health, their beliefs, or the effectiveness of their ministries? These are all important questions, well beyond the scope of this study but relevant to the mission of ATS and that of theological education more broadly as we seek to improve and enhance “theological schools to the benefit of communities of faith and the broader public.”¹⁷

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¹⁶ The survey revealed that only 15 percent of faculty who teach about pastoral care issues want more time devoted to scientific issues, despite reporting higher-than-average levels of classroom engagement. As Hill and Gin suggest, this is likely because they believe the relevant human and behavioral sciences are already “adequately integrated into their field of study” (Hill and Gin, “Engaging Science in Seminaries: A View from the Faculty,” 2016).

¹⁷ See One Mission section on the ATS webpage: <http://www.ats.edu/about>.