

**Thematic Pathway for Reaffirmation
Proposed Areas of Study
California Institute of Technology
May 14, 2018**

Executive Summary

With an undergraduate population of 1,000, a graduate population of 1,200, and an undergraduate to faculty ratio of 3:1, Caltech is a STEM-based research university that offers an academic and social experience unlike any other institution. The two themes chosen by the community reflect the institute's distinctive character: the Core Curriculum and Academic and Co-curricular Support Structures. The first theme focuses on the signature academic experience shared by all Caltech undergraduates. The second theme is comprehensive, and gives the Institute an opportunity to examine the many support structures – both academic and non-academic – that have developed in the last decade to help all of our community members thrive.

The Core Curriculum has been a theme in previous accreditation cycles because it is the centerpiece of the undergraduate experience. The Core is regularly being evaluated, and significant changes were made just prior to the 2010 accreditation. The Commission recommended that we “substantiate the effectiveness of the recent modifications,” and assess whether “the intended outcomes of the Core Curriculum” were being achieved. We welcome the opportunity to do that here. Since the last accreditation, several centers, initiatives, and offices have been established to support community members, including undergraduates, graduates, postdoctoral researchers, staff, and faculty. Other support structures have been expanded or revised. Gathering these programs under the thematic heading of Academic and Co-curricular Support Structures reflects the community's enthusiasm for them, and the TPR (Thematic Pathway for Reaffirmation) gives us the opportunity to examine their effectiveness and consider further improvements.

Overview of the institution

Founded as Throop University in 1891 and renamed the California Institute of Technology in 1920, Caltech is dedicated to basic research and excellence in the areas of inquiry pursued by our faculty. Caltech is a private, independent institution with a 124-acre campus located in Pasadena, California. Its mission is “to expand human knowledge and benefit society through research integrated with education. We investigate the most challenging, fundamental problems in science and technology in a singularly collegial, interdisciplinary atmosphere, while educating outstanding students to become creative members of society.” The main academic structure comprises six divisions: BBE (Biology and Biological Engineering); CCE (Chemistry and Chemical Engineering); EAS (Engineering and Applied Science); GPS (Geological and Planetary Sciences); HSS (Humanities and Social Sciences); and PMA (Physics, Mathematics and Astronomy).

Caltech's faculty and students pursue questions in a range of fields, from quantum science and medical engineering to geobiology and climate change, from biophysics and materials science to computer science and neuroeconomics. The shared goals are an expanded understanding of the universe and the world. Technologies of the future are invented at Caltech. Substantial grants and contracts from the federal government and private sources support much of the research activity on campus. The contributions of Caltech's faculty, alumni, and trustees have earned national and international recognition, including 38 Nobel Prizes, 58 National Medal of Science Recipients, and 13 National Medal of Technology and Innovation Recipients. The current faculty includes 73 National Academy of Sciences Members and 104 faculty fellows in the American Academy of Arts and Sciences.

The Institute offers a rigorous academic experience, with a strong tradition of preparing graduate students to excel as independent scientists and engineers through academic programs and original research investigations, and an undergraduate curriculum designed to provide students with a broad, interdisciplinary framework and with the tools needed to specialize in a particular field and to make connections across diverse fields. Research in basic science and technology is also a hallmark of the Caltech experience for undergraduates, graduate students, and postdoctoral researchers, many of whom go on to positions of eminence in the fields of engineering, science, law, medicine, academe, and entrepreneurship.

Process for the development of themes

The process of developing themes was an inclusive, consultative effort led by Caltech's provost, David A. Tirrell, Ross McCollum-William H. Corcoran Professor of Chemistry and Chemical Engineering and Carl and Shirley Larson Provostial Chair, and Cindy Weinstein, Eli and Edythe Broad Professor of English, vice provost and chief diversity officer. The reaccreditation planning committee comprises seven members: provost Tirrell; vice provost Weinstein; Kaushik Bhattacharya, Howell N. Tyson, Sr., Professor of Mechanics and Materials Science and vice provost; Kevin Gilmartin, Professor of English and dean of undergraduate students; Cassandra Horii, director, Center for Teaching, Learning, and Outreach; Diana Jergovic, vice president for strategy implementation; and Douglas Rees, Roscoe Gilkey Dickinson Professor of Chemistry, Investigator, Howard Hughes Medical Institute, and dean of graduate studies.

The planning committee reviewed the previous accreditation reports, discussed the mid-cycle review and the results of the IEEI (Inventory of Educational Effectiveness Indicators) and WASC feedback, with particular attention to suggestions made in the Commission's 2010 letter of accreditation. The planning committee met twice: first, to discuss strategies for outreach to the Caltech community; and second, to discuss the results of our outreach and the selection of themes for Component 8, "Institution-Specific Themes," of the Institutional Review Process.

Members of the planning committee met with four additional campus committees in order to discuss the valuable features of a Caltech education as a way of working toward potential themes. First, we met with members of the Council on Undergraduate Education, which comprises three undergraduates, one faculty member from each of the six academic divisions,

and the chairs of several academic committees, including the Curriculum Committee, the Core Curriculum Steering Committee, the Undergraduate Academic Standards and Honors Committee, the Freshman Admissions Committee, the Registrar, the undergraduate dean, and the chair of the faculty board. Second, we met with members of the Graduate Student Council Board of Directors, which consists of elected graduate student leaders. Third, we met with members of the Academics and Research Committee, which comprises undergraduates, the undergraduate dean, and the two undergraduate associate deans. Fourth, we met with the leadership of the faculty board, including the chair and the secretary. The themes were announced and discussed at the May, 2018 faculty board meeting.

The feedback was remarkably consistent and positive, which makes the planning committee confident that our two themes accurately represent what the community most values, and what is worth reflecting upon and assessing.

Description of each theme

The Core Curriculum is Caltech's defining academic experience and it is critical that we continue to review its content and assess its effectiveness. An evaluation of the Core demonstrates Caltech's commitment to Standard One, "Defining Institutional Purposes and Ensuring Educational Objectives (CFR 1.2), and also focuses the community on Standard Two, "Achieving Educational Objectives through Core Functions" (CFR 2.3, 2.4, 2.5, 2.6, 2.7, 2.10, 2.12) and Standard Four, "Creating an Organization Committed to Quality Assurance, Institutional Learning, and Improvement" (CFR 4.1, 4.2, 4.3, 4.4, 4.5, 4.6, 4.7). In undertaking a thorough review and assessment of the Core, Caltech can determine if we are achieving the desired outcomes. This assessment will be undertaken by Caltech's Institutional Research Office, with longitudinal data from the Registrar's Office, the Center for Teaching, Learning, and Outreach, teaching quality feedback surveys, and the undergraduate deans' office.

Since the last accreditation cycle, the Core has been revised with the goal of exposing students to new fields of inquiry and enabling students to complete the Core more quickly so that they can explore academic areas beyond the Core. Have all the changes been positive? Are our objectives being met, and if not, what needs improvement? At what pace are students completing the Core? Is the community satisfied with the balance of disciplines? Is the Core laying the groundwork for student success in advanced classes? We have decreased the number of math and physics classes, added biology, and restructured the humanities and social sciences requirements so that students write more and faculty provide greater feedback. The Core now comprises three quarters of mathematics, three quarters of physics, two quarters of chemistry, one quarter of biology, one chemistry laboratory course, and one additional laboratory course. Students also take a "menu course" in a discipline outside of the core. This can be introductory astronomy, geology, or information science and technology. Students must also complete twelve courses in humanities and social sciences. Three physical education classes are also required.

Caltech continuously evaluates the Core. Mechanisms include the Core Curriculum Steering Committee, the Academic Research Committee, the Council on Undergraduate Education, and the bi-annual Student-Faculty Conference, which brings together undergraduates and faculty to examine issues of most concern to the community. In addition, based on previous WASC assessments of the Core, in 2017 Caltech successfully applied for and received a two-year AAU STEM Education Network Mini-Grant, the Inclusive Caltech Core (IC²). This initiative is designed to improve pedagogy in introductory STEM classes by creating opportunities for faculty to engage with active learning techniques and to learn about ways of making the classroom more inclusive. Although IC² is still in its first year, faculty and students have shown remarkable enthusiasm for it, and it has already led to changes in how we deliver and assess Core courses. Data from IC² will be instrumental in our assessment of the Core.

The Academic and Co-curricular Support Structures theme reflects Caltech's deepening commitment to expanding offices, programs, and initiatives whose aim is to help our community members flourish. A comprehensive examination and evaluation of these structures, many of which have been established since the 2010 accreditation, will give us the opportunity to focus on Standard 1, "Defining Institutional Purposes and Ensuring Educational Objectives," (CFR 1.4), Standard 2, "Achieving Educational Objectives through Core Functions (CFR 2.11, 2.13), and Standard 3, "Developing and Applying Resources and Organizational Structures to Ensure Quality and Sustainability" (CFR 3.1, 3.6, 3.10). The assessment of these support structures will be undertaken by Caltech's Institutional Research Office, with longitudinal data from the Center for Teaching, Learning, and Outreach, the Caltech Center for Diversity, the Hixon Writing Center, Student-Faculty Programs, the Caltech Y, the Graduate Studies Office, and the Dean of Undergraduate Students Office. Several of the CFRs that appear in the Core Curriculum theme and comprise Standard Four, "Creating an Organization Committed to Quality Assurance, Institutional Learning, and Improvement," are also relevant for the Academic/Co-curricular Support Structures theme (4.1, 4.2, 4.3, 4.4., 4.5, 4.6, 4.7).

The support structures Caltech intends to evaluate are both academic and co-curricular. The academic structures include: the Center for Teaching, Learning, and Outreach, the Hixon Writing Center, the undergraduate deans' tutoring program, the graduate dean's outreach and recruitment office, the Innovation in Education Fund, and the Freshman Summer Research Institute. The co-curricular structures include: the Caltech Center for Diversity, Student Counseling Services, student funds for special projects, International Student Programs, and the Caltech Y. Since the last accreditation cycle, Caltech has created new support structures and improved established ones, determining where resources should be allocated based on input from students, faculty, and staff. The upcoming accreditation cycle gives us an opportunity to examine the programs we have developed and determine where refinement or further change may be necessary. How are these support structures being utilized? Who accesses them and how frequently? Are they making a positive difference, particularly as they are meant to support student success in our core academic and research programs? Do these support structures have common objectives, and if so, are they coordinating their activities and sharing information? Are they appropriately resourced? How might they be improved? Are the professional staff who typically lead them effectively connected with teaching faculty?

Like the Core Curriculum, assessment of these support structures has been an ongoing process, with each office or program evaluating the degree to which its outcomes are achieved. However, a coordinated assessment of these structures has not been attempted, in part because they may be housed in different parts of the Institute, and in part because the newer offices have only recently aggregated enough data to make such an evaluation possible. These support structures are now ready to take the next step and devise methods of strengthening their coordination and effectiveness. Many of Caltech’s program directors have a PhD or an EdD, and because they all have expertise in pedagogy, there is a rich archive of data from each of the offices we intend to assess. This theme will help us bring the data together and determine how well we are responding to the academic and co-curricular needs of our community. The following table summarizes the intersection of our proposed themes with WASC standards and criteria.

Standards Themes	One	Two	Three	Four
Core	CFR 1.2	CFR 2.3-2.7, 2.10, 2.12		CFR 4.1-4.7
Support	CFR 1.4	CFR 2.11, 2.13	CFR 3.1, 3.6, 3.10	CFR 4.1-4.7

Timeline for each theme

Because the Core Curriculum is a key component of a Caltech education, it has been a WASC theme in the last two accreditation cycles. Students and faculty discuss the Core every year in the Academics and Research Committee, the Core Curriculum Steering Committee , and the Council on Undergraduate Education. Every other year, the Core is a topic in the undergraduate organized Student-Faculty Conference. Having revised the Core during the last accreditation process, Caltech welcomes the opportunity to assess the effectiveness of recent changes to the Core before potentially considering new ones in the future. Our assessment of the Core will be happening at a particularly auspicious time, given the activity and collection of data supported by the IC² initiative. While the TPR will have a completion date, Caltech’s review of the Core will continue.

The Academic and Co-curricular Support Structures theme is, like the Core, a work in progress. The various offices, projects, and activities that will be evaluated are both relatively new (the Center for Teaching, Learning, and Outreach celebrated its five-year anniversary; the Innovation in Education Fund recently supported a host of pedagogical projects designed to enhance the student experience) and newly expanded (the Freshman Summer Research Institute increased the size of its cohort from approximately twelve to twenty; the Hixon Writing Center hired two new STEM writing specialists this year; the graduate deans’ office added the outreach and recruitment officer four years ago). These support structures have increased visibility and

importance to Caltech, and only by assessing them in a coordinated way will we understand just how instrumental they may be to the community and how they might be improved.

Resources

In order to examine and assess the themes of the Core Curriculum and Academic and Co-curricular Support Structures, Caltech will leverage its most precious asset: its faculty, staff, and students. The time spent by the community will be our primary financial investment, although other costs will be incurred, such as bringing Barbara Gross Davis, our WASC liaison, to Caltech to meet with campus leaders involved with accreditation, and sending campus leaders to WASC conferences. Because Caltech is small, our ethos is consultative and student engagement is encouraged, expected, and essential. We therefore anticipate a fully-engaged community effort, although the precise number of participants is difficult to predict.

The provost's office will coordinate and manage both projects. The office of institutional research will be at the helm of assessing both themes. The review of the Core Curriculum theme will involve a subset of faculty teaching in the Core, as well as faculty, staff, and student members from the Core Curriculum Steering Committee, the Council on Undergraduate Education, the Inclusive Caltech Core, et al. The review of the Academic and Co-curricular Support Structures will involve a subset of faculty and staff participants from the Center for Teaching, Learning, and Outreach, the Caltech Center for Diversity, the Student-Faculty Programs office, the Dean of Undergraduate Students and Graduate Studies offices, et al.

Institutional Stipulation

Please see Institutional Certification Form