

Ways of Thinking/Ways of Doing

A capacity-based approach to fostering breadth in General Education Electives

(Approved by the Breadth Governance Board October 12, 2012)

The Study of Undergraduate Education at Stanford (SUES) was charged with examining Stanford's requirements "as part of the overall structure and fabric of undergraduate education." A central recommendation of the SUES report was to transform the mechanism by which undergraduates achieve educational breadth from one based on sampling disciplines to one based on essential capacities, or *Ways of Thinking* and *Ways of Doing*. For students, the new focus on capacities should help them be more purposeful and less instrumental in designing their own educations—in effect, to actively create an education rather than passively receive it. For faculty, the focus on capacities rather than disciplines should provide students with tools, information, and guidance needed to enable them to become adaptive learners, readily able to meet the unanticipated challenges that lie ahead.

Eight *Ways of Thinking/Ways of Doing* (hereafter *Ways*) were defined, developed, and refined by SUES and approved by the Faculty Senate. A Breadth Governance Board (BGB), comprised of faculty from disciplines spanning much of undergraduate education, was formed and entrusted with responsibility for a final articulation of the *Ways*, and for ongoing oversight of our breadth requirements. The BGB is charged to work in close collaboration with the Vice Provost for Undergraduate Education both to instantiate the system—registering existing courses in appropriate *Ways* and fostering new course development where sufficient offerings do not yet exist—and to maintain it, keeping the *Ways* system robust in the future.

This document describes each of the *Ways*, as articulated and approved by the BGB. It has been written mainly for the purpose of communicating to faculty the meaning of each *Way* in order to facilitate choices in offering courses as part of the new system. This document is also intended to provide a sense of the spirit in which the descriptions of the *Ways* have been constructed so that the faculty can read beyond what is written here. It is our hope that in doing this, both faculty and students will be empowered to engage Stanford's new system of General Education Electives in imaginative ways that both foster breadth and take advantage of the many opportunities Stanford has to offer in support of a liberal education.

General Education Electives based on *Ways of Thinking/Ways of Doing*

If students are to choose their General Education Electives in a thoughtful way, we must articulate both what we require, and why we require it, in terms they will understand. We have therefore constructed the descriptions of each *Way of Thinking/Way of Doing* with three supporting elements: first, an explicit rationale for each *Way*; second, a set of example learning outcomes (*i.e.*, course goals) that might result from courses modeling a particular *Way*, and finally, a brief discussion of how students might fulfill each requirement. The rationale for each *Way* is intended to provide motivation for the capacity we want students to develop, and to explain why it is important. Therefore, every course registered under a particular *Way* should be clearly aligned with its rationale. The course would not, however, need to satisfy all of the example learning outcomes offered for that *Way*. In prototyping the system with various

courses, we have found that courses can model a particular *Way* quite well while fulfilling anywhere from just one to essentially all of the example learning outcomes. One course might embody a single outcome so well and completely that this outcome alone assures the fit is good. Conversely, other courses might embody the entire list of outcomes, as though the course were purpose-built for that *Way*. In considering where a particular course might fit within the *Ways* system, faculty and students should recognize that both ends of the spectrum can be valid indicators of a suitable course assignment, so long as the rationale fits.

Similarly, we hope that the array of courses available to students in this new system will include both foundational courses that deliver a significant amount of disciplinary knowledge, while also modeling the relevant *Way* in a clear fashion, and courses designed specifically to demonstrate the *Way* for non-majors, and thus achieve many of the learning outcomes. Both kinds of courses are desirable, and both are anticipated in the new system.

It is also important to recognize that *example learning outcomes* are listed here for the sole purpose of elucidating and illustrating a particular *Way*. The examples are not meant to restrict or confine a course to a predefined set of outcomes, nor do they constitute a guarantee that every student will achieve every outcome. Their purpose is to provide guidance in finding a good fit.

We caution faculty against too strongly associating any of these *Ways* with a particular collection of disciplines. In moving to a capacity-based system, our expressed intent is not to privilege any particular discipline within any *Way*. In other words, although most courses from a discipline might fit very well within, and even epitomize a particular *Way* (for example, math courses in Formal Reasoning, or art practice courses in Creative Expression), this does not imply that these disciplines are the sole means by which a student might navigate that *Way*, nor should those courses constitute a default pathway. In considering our current course offerings, numerous courses transcend traditional disciplinary boundaries and provide new options for students to develop key capacities. In interpreting the *Ways of Thinking/Ways of Doing* system, the BGB welcomes innovation in how our faculty deliver, and students acquire, the capacities that are essential for a liberal education.

Registration of Courses in the New System

Each Department or Interdepartmental Program may choose between two approaches to the registration of courses. For those that prefer to have a program-wide discussion, that discussion should take place during the fall with the intended outcome of providing a list of courses for registration by Dec. 14. Other departments/programs might feel as though an extended discussion is not required and that courses such as existing GERs can be registered immediately. In that case we will work directly with the Director of Undergraduate Studies of each program (and their Student Services counterpart) to accomplish the registration of courses during the fall. Regardless of the path chosen, the BGB understands and anticipates that the list of courses will not be complete and that new courses are likely to be added later in the year. This is necessary both for the purpose of overall planning within programs, and to provide faculty with the opportunity to consider offering new and innovative courses designed specifically for the *Ways* model. Recognizing this, it is the BGB's objective to register as many courses as possible in the fall with the balance of registration occurring early in the winter. Our goal is to establish a useful-but-not-final inventory by the end of the winter. That inventory will form the basis of outreach efforts (in the spring) to obtain additional courses in *Ways* that appear to have an insufficient number of offerings to support student choice. We also hope that department

discussions in the fall will lead to development of new courses in the various *Ways* and encourage early and active discussion of potential offerings with the VPUE.

In order to provide students with the ability to make informed choices about *Ways* courses, three elements must be designated when registering a course:

- (1) The *Way* (or *Ways*, up to two) for which the course should be registered. The purpose of this element is self-evident: it constitutes the basic designation.
- (2) At least one *Example Learning Outcome*, or *Custom Learning Outcome*, or *Course Objective* that reflects how the course models the particular *Way* designated. This will provide students with an idea of how the course supports the development of capacities related to that *Way*. We plan to survey students after completing the course to assess how well the course modeled that outcome/objective and thereby reflected the particular *Way of Thinking* or *Way of Doing*. Our intent is to provide clear messaging to students: “We are asking you to do this. Here are the reasons. This is what you might expect to get from this. How well did the course fit?”
- (3) The course syllabus or first-day handouts (and any other material that the instructor would like to make available to students through Explore Courses). This information will enable students to make informed choices about course selection. If a syllabus has already been uploaded into the Stanford system, a simple link will suffice. If not, or if the instructor prefers to provide an extended syllabus or expanded handout (of the kind often used on the first day of class), that can be uploaded and made available to students through Explore Courses. (Syllabi will not be released for other purposes without faculty permission.)

In addition we will ask if the instructor would like to restrict enrollment in the course for the purpose of supporting the breadth requirement. This can be accomplished using a number of possible restrictions—*declared majors only*, *strict enforcement of prerequisites*, etc.—and might be important for certain courses that would otherwise be oversubscribed.

In designating the outcomes or objectives that connect a class with a *Way*, we anticipate that some faculty will select from the Example Learning Outcomes listed for each *Way* below. Other faculty may prefer to enter their own Custom Learning Outcomes, tailored to show how a particular course models the *Way*. Still others might prefer not to use learning outcomes at all, and would rather designate one or more Course Objectives that communicate to students how the course connects with its *Way*. Any of these methods of communication—or even a mixture of the above—will fulfill our goal of providing clear messaging to students about the new breadth model and how we deliver it.

Review and Approval of Courses by the Breadth Governance Board

Upon registration of a course in the *Ways* system, its registration information (*Way*, learning outcomes or course objectives, syllabus or first-day handouts) will be reviewed by a subset of the BGB that is most familiar with the *Way* in which the course has been offered. In cases where the fit is clear, the course will be registered without further action. In cases where additional information is required, a member of the BGB will contact the faculty or department offering the course in order to clarify the offering or obtain additional information. In cases where a course offering appears not to fit, or where the offering suggests that further discussion is required, the course will be referred to the full board for discussion.

The Ways of Thinking and Ways of Doing

1. Aesthetic and Interpretive Inquiry

Requirement: Two courses devoted to theoretical, historical, or critical analysis of texts, art works, cultural artifacts, cultural practices, or philosophical concepts.

Rationale: Every reflective person needs to confront the variety of cultural and artistic efforts to express and understand the human condition. These efforts include theoretical traditions, such as philosophy, and aesthetic or expressive traditions, such as literature, music, and the visual arts. Students should develop the analytic techniques and interpretive skills to appreciate and understand both creative and theoretical achievements of human cultures, and thus to nurture a deeper conception of their own place in the universe.

Example learning outcomes: Students should be able to

- appreciate the nature of human responses to meaningful cultural objects, and distinguish among the different methods to interpret those responses;
- acquire and assess techniques of interpretation (including close reading techniques), criticism, and analysis of cultural texts, artifacts, and practices;
- demonstrate facility with the analysis of arguments for and against different theories and interpretations;
- recognize the frameworks for thought and action implicit in human practices, and analyze the different assumptions underpinning those frameworks;
- understand diverse artistic, literary, and theoretical traditions, their characteristic forms of production, and/or their development across historical time;
- understand how expressive works articulate responses to fundamental human problems and convey important values.

How students might fulfill this requirement: By taking courses in the humanities or in arts classes that stress interpretation and analysis. Appropriate courses would focus on the interpretive understanding of cultural practices and products, rather than the empirical explanation of how social structures produced them. Thus, a course devoted to the literary analysis of some text(s) or the development of a particular literary tradition would belong here, whereas a course on the sociology of literary societies or the economics of the art market might fit better in Social Inquiry. In many cases courses appropriate for this requirement will take up works (or genres, ritual practices, etc.) as objects of interpretation one by one, rather than focusing on the importance of certain mores or practices in wider social and historical processes. Thus, courses on the history of literature or art devoted to the interpretation of characteristic works and genres, or courses offering distinctively interpretive explanations of a particular cultural practice in religious studies or cultural anthropology might belong here, whereas the study of the historical role or evolution of certain cultural mores or movements might fit better in Social Inquiry. Courses devoted to the *interpretation* or *analysis* of scientific knowledge (such as those in the history of science or philosophy of science) would fit here, rather than in Scientific Analysis, since they would take up as the primary target of inquiry a higher-order effort to understand the scientific practice as such, rather than focusing primarily on the objects of scientific study and their explanation.

2. Social Inquiry

Requirement: Two courses that use methods in the social sciences and/or historical inquiry to recognize and analyze human behavior and forms of social, political, and economic organization as well as linguistic practices and the human capacities that make society possible.

Rationale: Human beings are social and create social structures and societies, and those societies, in turn, shape and provide opportunities and constraints to individuals. To understand human behavior and to exercise responsible citizenship, students need to be able to think critically about social orderings, their own as well as others, and to recognize and analyze, across space and time, distinctive forms of social and economic organization, political institutions and ideologies, patterns of social differentiation and stratification, and linguistic practices. At a still deeper level, students need tools for understanding the behaviors and propensities at the root of human sociality, as well as the complex ways in which those behaviors and propensities vary and change across space, time, and individual circumstance.

Example learning outcomes: Students should be able to

- apply the methods of research and inquiry from social science to the study of human behavior in social, political, and economic organizations;
- understand and evaluate historical and social change;
- analyze the origins of social institutions and social structures;
- analyze the effects of one or more kinds of social institutions and social structures on human action;
- use and evaluate either qualitative evidence or quantitative data in social inquiry;
- critically evaluate primary and secondary source materials, and use both to explain social and historical phenomena;
- use strategies for basing conclusions about society in data including causal reasoning, historical contextualization, hypothesis testing, modeling, and critical analysis of behavior and institutions;
- learn what makes a question about human behavior or the behavior of social institutions and structures empirically tractable and significant, and thereby become a capable consumer of research.

How students might fulfill this requirement: We expect that most students would fulfill this requirement by taking courses in the social sciences, in history, or in the systematic sciences of human behavior and cognition (e.g., psychology, linguistics), although some courses from other humanities fields devoted to the empirical study of social practices, social processes, and their history might also fall into this breadth area. Most courses in political science, sociology, economics, and anthropology would be natural fits for this requirement. Many, but not all, courses in psychology and linguistics should also fit. Social psychology and sociolinguistics would be central cases in point, and many courses from the rest of linguistics and from cognitive, developmental, and affective psychology are intended to be encompassed by the inclusion of study devoted to the human capacities at the basis of sociality.

3. Scientific Method and Analysis

Requirement: Two courses that explore our current understanding of the governing principles of the natural world and the methods by which that understanding is enhanced, revised, and extended into new domains.

Rationale: Scientific literacy is critical to complex problem-solving and touches many aspects of human life. Such literacy includes an intellectual curiosity about the natural and physical world and a familiarity with the way in which knowledge about that world is obtained, analyzed, and interpreted. Courses addressing scientific method and analysis enhance the students' abilities to analyze and synthesize scientific information, understand the limitations and strengths of existing theories, ask strategic questions, and assess empirical evidence that bears on them.

Example learning outcomes: Students should be able to

- extend their knowledge of the natural or physical world beyond that obtained from secondary education;
- understand the distinction between scientific evidence and theory, and the role of each in scientific inquiry;
- utilize inductive and deductive reasoning, and understand the role of each in scientific inquiry;
- understand and utilize the scientific method in formulating hypotheses and designing experiments to test hypotheses;
- assess and synthesize scientific evidence, concepts, theories, and experimental data relating to the natural or physical world;
- refine their powers of scientific observation, the essential process by which data is gained for subsequent analysis;
- apply conceptual thinking to solve certain problems, bypassing calculations or rote learning and relying on the fundamental meaning behind laws of nature.

How students might fulfill this requirement: This requirement might be fulfilled using many of the traditional introductory courses in the natural, physical, and earth sciences, engineering sciences, as well as social sciences that examine or utilize principles underlying the physical or natural world. New courses specifically designed to fulfill the learning goals of this requirement might be designed for students who are not scientists or engineers. Courses that emphasize human behavior belong in Social Inquiry, whereas courses that explore the biological mechanisms that underlie behavior are appropriately listed under Scientific Method and Analysis. No restriction is placed on the relationship between the two courses that students will take in this Way: We expect that some students will be well served by taking courses in two different fields (or with two different approaches), while others will want to take two courses in a single field to obtain a more significant understanding than can be achieved in a single course.

4. Formal Reasoning

Requirement: One course that involves rigorous deductive thinking, epitomized by the mathematical and algorithmic sciences (as opposed to inductive reasoning that is covered by Applied Quantitative Reasoning).

Rationale: The type of thinking required by the formal sciences—those branches of knowledge concerned with the development, understanding, and manipulation of symbols based on formal rules—forms the underpinning of decision making and analysis in many fields and is a prerequisite for engaging in applied quantitative analysis of critical, data-based questions. Extending and refining formal reasoning skills allows students to enhance their ability to understand and respond to the challenges posed by an increasingly complex world.

Example learning outcomes: Students should be able to

- use deductive reasoning correctly through the study of particular examples in an area of interest at the collegiate level;
- manipulate a system of symbols logically and consistently so as to derive or prove new results of particular interest or utility;
- study complex processes or systems using theoretical models to predict their outcomes;
- solve equations or optimization problems through translation to a standardized formalism.

How students might fulfill this requirement: Most students would fulfill the Formal Reasoning requirement through courses in mathematics, probability, logic, or computer science. Students studying subjects where quantitative/algorithmic tools are not foundational for further study might be well served by a course in mathematics that fit with their area of specialty, or a course that supports an interest they might pursue under the Applied Quantitative Reasoning requirement. Some students will prefer to fulfill this requirement outside of a STEM (Science, Technology, Engineering or Mathematics) department, and will get the most out of a course in logic or linguistics with a significant component of formal reasoning. Courses that meet the Formal Reasoning requirement will typically include assignments where students show their mastery and skill in using the symbols and logic acquired at the collegiate level (solving equations, programming, model simulation, solving optimization problems for instance).

5. Applied Quantitative Reasoning

Requirement: One course in which quantitative analytical tools are presented and brought to bear by students on a significant problem of particular interest.

Rationale: Many decisions and judgments in life are made on the basis of large amounts of data, which can be incomplete or otherwise imperfect, and technically complicated. These decisions are motivated first and foremost by a larger context and are beyond the realm of purely deductive reasoning. Cultivation of this way of thinking will give students a familiarity with complex phenomena, how they are analyzed, and how to predict and alter their behavior even in the face of uncertainty. An essential component of this requirement is the application of analytical and numerical tools to important problems of interest to the student.

Example learning outcomes: Students should be able to

- analyze data and apply empirical methods to solve relevant problems, guide decision-making, and/or answer questions of wide concern;
- distinguish between causal and correlational evidence, as well as recognize when the available evidence is too weak to decide a matter;
- design ways to alter the behavior of a system, device, or process in a purposeful, useful way in a deterministic fashion or under conditions of uncertainty;
- recognize common mistakes that human beings make in empirical reasoning and quantitative problem solving including critical examination of the work of others;
- choose appropriate probabilistic or empirical models for a given problem, using information from observed data and knowledge of the system being studied.

How students might fulfill this requirement: Evaluation of empirical and analytical techniques necessarily comes from a wide range of contexts including engineering and design, earth sciences, public policy, education, law, the social sciences, medicine, and the natural sciences. Students are encouraged to consider taking a course in which they apply their analytical skills in new contexts, in a way that may prepare them for later in life. Students may also fulfill this requirement through courses using statistical, mathematical, and analytical methods within their major. Courses that meet the AQR requirement typically include analysis assignments where they visualize numerical results from an experiment or the results of a data manipulation exercise and then interpret the resulting plots.

6. Engaging Diversity

Requirement: One course that involves the rigorous study of diversity, which can also include experiential learning, in the domains of gender, ethnicity, religion, physical ability, sexual orientation, language, and social class towards an analysis of equity.

Rationale: In a globally interconnected world, it is ethically and practically crucial that students develop an awareness of and understanding of differences. Gaining knowledge about diversity and public scholarship extends students' understanding of the social contexts that frame our communication and collaborations with one another and enhances their ability to respond to cultural challenges.

Example learning outcomes: Students should be able to

- evaluate how existing social arrangements create and maintain social differences among people;
- acquire an understanding of the history and traditions of diverse groups of people and how social differences have changed over time;
- manipulate challenges that surface in interactions between people with different backgrounds, worldviews, environmental opportunities, and how social contexts exacerbate or reduce these challenges;
- explore power relationships within social, racial, gendered and cultural contexts and how those relationships have changed over time;
- assess and synthesize evidence about programs and interventions designed to promote diversity and inclusion.

How students might fulfill this requirement: Students might fulfill this requirement by completing a traditional academic course, for example, some of the offerings in Comparative Studies in Race and Ethnicity (CSRE) and in Feminist Studies. Under certain conditions, this requirement could be fulfilled by more direct experiential means (for instance through a service learning course, or in connection with an overseas studies or Haas Center participation). In the latter case, an academic component, incorporating reflection and synthesis, would accompany experiential learning.

7. Ethical Reasoning

Requirement: Students are required to take one course that devotes a majority of course time either to exploring ethical theories, or to applying ethical theories to important personal, social, or political questions.

Rationale: Human conduct, individually and collectively, involves ethical notions that call for our attention and reflection. Those notions include standards of right and wrong action, judgments about which human ends are worth pursuing, and ideas about valuable qualities of human character. Ethical inquiry thus explores moral rights and responsibilities, fairness and decency, personal virtue and vice, the worthiness of individual choices and the rightness of public policies. An ability to reason about ethical issues, draw defensible conclusions, and assess competing ethical claims is fundamental to individual development and to effective social participation.

Example learning outcomes: Students should be able to

- distinguish facts from values;
- discern the ethical issues at stake in individual and collective decisions;
- identify, understand, and use multiple normative concepts and arguments;
- evaluate competing ethical perspectives on human problems and action;
- articulate and critically evaluate distinct ethical perspectives on concrete dilemmas.

How students might fulfill this requirement: Students might fulfill this requirement with courses that examine a particular ethical theory or theories (utilitarianism, for example) or with courses that consider questions of ethics in a number of contexts. For example, some of the offerings on ethics in science, technology, and society, philosophy, political science, human biology, law, etc. Courses that meet the Ethical Reasoning breadth requirement typically include writing assignments focused on some ethical question or questions, or on analyzing a concrete case, policy, or dilemma using an ethical framework or frameworks.

8. Creative Expression

Requirement: One course involving the practice of creativity and/or self-expression is required. (Where stipulated by the instructor, this course may be taken for an S/NC grade.)

Rationale: The ability to design, to create, and to perform – each enriches our lives in substantial and meaningful ways. Thinking creatively, giving expressive shape to ideas, and communicating those ideas with imagination and precision are not only indispensable to all artistic endeavors, they also represent broadly applicable skills that strengthen and enhance traditional academic pursuits, stimulate effective problem-solving, and foster originality and innovation in new areas. In forging connections among the disciplines, between theory and practice, knowledge and invention, pure and applied scholarship, analytic rigor and creative imagination, Stanford’s strong and vital programs in the creative arts reflect an educational philosophy that has defined the University since its founding.

Example learning outcomes: Students should be able to

- explore their own potential to produce original creative projects;
- engage in artistic collaboration and the creative reinterpretation of art made by others;
- take creative risks beyond their comfort zones;
- experience what it is to make the unimagined possible and real;
- appreciate how experimentation, failure, and revision can play a valuable role in the creation of successful and innovative works;
- consider multiple and possibly divergent solutions to a problem;
- explore the role of artistic expression in addressing issues that face society.

How students might fulfill this requirement: The courses already available in the creative arts—from product design and architecture, to sculpture and the graphic novel, dance and musical and dramatic performance—offer students a wide variety of options in this area. We expect that many students will make a choice from one of the arts departments or the program in creative writing, while others will undertake design work through Engineering. Arts department courses devoted primarily to critical analysis and exegesis, however, belong under “Aesthetic and Interpretive Inquiry” rather than under this area, which should focus on courses devoted to artistic practice. Courses that offer instruction in practical skills will meet the requirement provided the syllabus is not limited to the mechanical acquisition of such skills but also affords students freedom and opportunity to express their creativity and imagination.