Rubric 2.0:
Core Elements of SENCER Courses and Curricular Programs

Introduction: The General Form and Purpose of the Rubric

What makes a course or curricular project a "SENCER course" or a "SENCER project"? To what extent does an examination of a course or project demonstrate the presence or absence of components associated with the SENCER ideals? These are the two basic questions that the rubric is designed to help answer.

Various elements of course design, faculty practice and institutional policy-making—some common to lots of good designs and practices and others that are more specific to the SENCER approach—are presented in the following pages. Each carries a brief description. For each, the person(s) completing the rubric is invited to consider the following four options:

(1) Not Observed—the element was not observed in the material reviewed,
(2) Basic—the review showed evidence of that the element was present at a level described in the chart as "basic,"
(3) Advanced—the review showed evidence of the presence of the element at a level described as "advanced", and
(4) Transformative—the review showed evidence that was so advanced so as to be transformative, according to the application of the rubric.

Using the rubric is like doing an audit; that is, you will be looking at material evidence to make the assessments. This evidence may consist of a review of relevant course materials, such as syllabi, texts, websites, assignments, completed projects and tests, assessment findings, video/audiotapes, reports, journals. The evidence may also come from transcripts of interviews with students and professors, etc. When using the rubric, you will want to note your "findings" as well as the source of the evidence on the rubric form itself in the space below each "table."

The table at the top of the next page suggests the general criteria for what we mean by each "level" designation. The categories (except for "not observed") are not presented as "alternatives" to one another. Rather, the movement from basic to transformative may be, in many instances, "cumulative"—that is one would find evidence of each level, so that the highest level would contain elements listed in the basic and advanced categories. The categories are hierarchical; each builds upon and incorporates elements found in the prior category.

Not Observed	Basic	Advanced	Transformative
-The item was not observed in the material reviewed.	- Fully achieves institutional goals for learning at the course level - Promotes contextualized knowledge - Demonstrates STEM connections to civic issues	- Addresses multiple learning goals - Advances the institution's civic mission - Engages students in specific interdisciplinary activities and learning	- Promotes and enables knowledge transfer - Increases probability that students will use scientific knowledge or thinking in other situations or problems

I. Identifying Interests and Motives: Establishing The Bases for Choosing the Course or Program's Narrative Focus or Foci

This involves identifying student/faculty interests and motives in order to choose the complex, large, unsolved civic issue that will become the 'narrative focus' of the course or program.

Choosing a narrative focus to plan effectively for the course/project

Not Observed	Basic	Advanced	Transformative
	- Civic issue(s) in the course is/are clearly identified. -Civic issue(s) reflect(s) instructor's interest and is/are presumed to be of interest and relevance to students	- Routinely develops an inventory of student interests and assets to be used in the course - Routinely employs formal and informal assessment strategies to determine interest in the course and course topics	- Actively engages students, faculty colleagues, relevant community and other assets in planning course format, delivery and content

II. The "Context": Cataloging the Elements of the Complex, Capacious, Civic Issue(s) To Be "Taught Through"

This entails cataloging the dimensions of the larger narrative issue (the 'complex, large, unsolved civic matter,' or phenomenon) that will be employed to organize the course or program. The "narrative focus" may be more than just one issue, rather a range or collection of issues whose inner-connectedness (or disconnection) is explicitly described.

Course Themes

Not Observed	Basic	Advanced	Transformative
	- Frequently uses elements of selected civic phenomena to aid in achieving learning goals - Shows the connection of learning in this discipline to public policy questions and context - Identifies the public or civic dimensions of STEM learning	- Course is organized so that selected civic phenomena serve as the 'master narrative' for the course - Course encourages learners to connect specific scientific and civic narrative elements to other questions and issues	- Advances understanding of the connection between STEM content with civic phenomena - Advances institutional public service mission and/or impacts a matter of civic consequence or identified public need in a way that is especially noteworthy

III. The "Content": Choosing the Canonical STEM or Other Disciplinary Elements or Learning Goals To Be "Taught To"

This speaks to choosing very specific learning aims and goals for the course or program and developing a list of the canonical elements in the STEM or other discipline(s) to be taught through the course or program.

STEM and Other Core Content

Not Observed	Basic	Advanced	Transformative
	- Provides core disciplinary content expected of courses at its level (introductory, major, or capstone)	- Leads students to be interested in pursuing more sophisticated (or higher level) learning within the discipline (increases students' intellectual stretch")	- Mirrors and reflects contemporary, interdisciplinary intellectual challenges in the discipline, including the connections to other disciplines

IV. Pedagogies: Matching the Instructional Strategies to the Course Goals

This involves matching the dimensions of the civic issue to the canonical elements and selecting the pedagogical strategies (including texts, exercises, assessments) most likely to promote and produce the desired learning outcomes.

Learning Objectives

Not Observed	Basic	Advanced	Transformative
	- Clear, transparent learning objectives are communicated to students	- Learning goals are integrated with explicitly stated broader STEM learning objectives - Learning goals are integrated with explicitly identified broader institutional learning outcomes - Learning goals are linked to students' goals for personal and career development	- Instructor and students collaborate in developing learning goals - Linkage of course goals to goals of other related or complementary courses is made explicit - Individual student learning goals are explicitly taken into account in establishing course objectives

Instructional Strategies

Not Observed	Basic	Advanced	Transformative
	- Instructor employs a variety of pedagogical techniques (not lecture alone) - Instructor matches specific pedagogies to learning goals and explains choices of pedagogies to students - Employs pedagogical techniques that are efficient in advancing student learning	- Engagement with learning is demonstrated in practice, performance, and/or portfolio - Instructor uses assessment findings to validate and/or modify pedagogical techniques	- Assessment findings lead dynamically to invention and use of new pedagogical strategies

Knowledge Production

Not Observed	Basic	Advanced	Transformative
	- Course/program Includes some form of basic, authentic undergraduate research	- Undergraduate research in the course is linked to a civic or community need (e.g., through community-based research or academically-based service learning)	- Research results strengthen existing knowledge base and are made available for others to use (especially to community stakeholders, if applicable) -Results of research efforts are maintained in a way that makes use of prior work and expansion of research possible.

Utility: Preparation for Future Engagements and Responsibilities

Not Observed	Basic	Advanced	Transformative
	- Pedagogies help develop skills that are useful to students in multiple courses or fields	- Pedagogies and experiences in courses are adapted to and help students meet specific civic or workforce needs/challenges	- New pedagogies emerge from efforts to address civic or workforce needs

V.   Action: Answering the Question—"Now That You Know Something, What Can You Do About It?"

This refers to the opportunities for practice (rehearsal) and/or action (civic engagement) that the course or program presents and the incorporation of these activities in the course or program.

Civic Engagement

Not Observed	Basic	Advanced	Transformative
	- Identifies opportunities for putting knowledge in action - Provides opportunities for rehearsing the application of knowledge within the context of the course	- Students are empowered to make decisions about the civic actions they wish to take - Provides opportunity or structure for students to engage in some form of public education pertinent to STEM and civic question	- Course provides opportunities for students to design and implement their own actions in response to new learning

VI.   Assessment: Learning for Continuous Improvement

This involves designing continuous assessment of the course or program and its learning outcome and making adjustments based on the assessment findings.

Process Assessment

Not Observed	Basic	Advanced	Transformative
	- Uses the SENCER-SALG or other method that measures effectiveness of course delivery - Assessment methods are consistent with pedagogical techniques	- Employs frequent assessments with feedback to students at both individual and group levels - Uses assessments as teaching tools - Instructor is responsive to assessment results in adjusting course materials, delivery, and content; assessments are stepping stones, not milestones	- Assessment is used as a tool for promoting and ensuring student achievement - Assessments inform differentiated delivery of instruction and utilization of materials and resources, matching students' needs and capacities

Student Learning Outcomes Assessment

Not Observed	Basic	Advanced	Transformative
	- Uses SENCER-SALG or other method that encourages students self-assessment (meta-cognitive reflection) - Employs continuous formative assessment to permit adaptations in instruction	- Employs assessments that are directly and appropriately tied to particular pedagogical strategies -Promotes instructor self-assessment	- Demonstrates transferability of learning to other situations - Assesses how the learning in this course affects learning in other courses

Instructor Self-assessment

Not Observed	Basic	Advanced	Transformative
	- Uses results of SENCER-SALG or other assessment methods to reflect on students' perceptions of effectiveness of learning strategies	- Uses a formal system or structure of assessment, such as the scholarship of teaching and learning, to guide reflection and adaptation of course	- Instructor communicates own learning to students, colleagues, peers - Instructor organizes peer-review of his/her teaching

VII.   Promoting Interdisciplinary Learning

This entails paying attention to how the content of the course or program (the "interdisciplinary trouble" that the civic issue represents) get related to the other elements in an institution's curriculum the goals for student learning.

Not Observed	Basic	Advanced	Transformative
	- Connections to other disciplines as sources of knowledge valuable to understanding the subject matter of the course are make explicit	- "Intersections" among disciplines and courses are organized to show connectedness and encourage collaborations -Assignments and other activities demonstrate interactions between science and social science, science with other sciences and math, science and other pre-professional and humanities programs.	-Course introduces and engages students with an advanced multidisciplinary problem of project -Sequence of courses (learning community or similar strategy) is used to organize learning both across the curriculum in any given semester or year, but throughout the curriculum over several years. -Recognition of interdisciplinary focus is formalized in a certificate program or other symbol of accomplishment.

VIII.   Incorporating and Achieving "21st Century Skills"

The so-called "2ist century skills" center on students across the collegiate experience and include such things critical thinking, effective communication, capacity for collaborative work,

imagination and inventiveness, global awareness, and preparation of graduates to be self-directed learners.

Not Observed	Basic	Advanced	Transformative
	- Identifies 21st C skills in syllabus and indicates where they will be incorporated (experienced) in the course/program	- Explicitly includes "lessons" in developing skills and opportunities to practice skills in the course or program. -At least one course outcome is a portfolio demonstrating skills and learning	-Builds course/program around the development of these skills in parallel with other learning objectives -Provides students with opportunities to demonstrate how they are preparing themselves to continue to develop 21st C skills following the course/program enrollment.

IX.　　　Institutionalization and Sustainability

This entails the position of the course/program within an institution's curricular offerings and an assessment of the durability (or relative permanence) of a course/program within an institution's curriculum.

Satisfaction of General Education STEM or Other Requirements

Not Observed	Basic	Advanced	Transformative
	- Provides course credit in a STEM field to satisfy a general education or similar requirement	- Is cross-listed in order to permit a student to use successful completion of the course to earn credit in either a STEM or other field	- Supplemental activity (such as special project, undergraduate research, or experiential learning activity) expands disciplinary core content learning and thus permits course credit to be applied to major

Course Level and Sequence (For "Introductory" Courses Only)

Not Observed	Basic	Advanced	Transformative
	- Course resides within established sequence and curricular pathways	- Course features are attractive to a broad spectrum of lower division undergraduates - If introductory for majors, course features promote retention of students in the discipline	- Course design and instructional strategies increase the probability that students will take the course before determining or changing major - There is a well-thought plan to encourage students to enroll in the course as early in their

			academic careers as possible

Sustainability/Durability

Not Observed	Basic	Advanced	Transformative
	-Course is adopted provisionally for a set period of time -Course is staffed by a person whose association with the institution is stable	-Course is officially adopted within the institution's curriculum -Course is taught or "owned" by an instructor with a permanent appointment	-Provisions are in place to provide development opportunities for new instructors to teach the course or program.

X.   Contributing to the STEM Education Knowledge Base

This entails making the results of one's efforts available to varieties of communities of practice and persons interested in learning how to improve STEM and related education.

Not Observed	Basic	Advanced	Transformative
	- Results are shared with professional colleagues	- Instructor presents course results to relevant curricular and other committees and engages, in assisting colleagues in applying or adopting results in their courses - Instructor engages in the scholarship of teaching and learning - Results are shared in presentations and discussions at professional meetings and conferences	Instructor/students/others publish of results in professional journals -Results are shared with community and other stakeholders via local or other media

Q: So, what distinguishes a SENCER course from a course that is not a SENCER course? And a SENCER instructor from another instructor?

A: A SENCER course is one that (1) begins by taking into account the interests and motives that students and faculty bring to it, (2) is framed within a complex, unsolved question of civic consequence, (3) helps students learn key content, processes and skills in one or more disciplinary tradition, (4) carefully matches pedagogy to learning objectives, (5) encourages discovery of new knowledge or new connections on the part of the student, (6) enables a student to identify and practice what to do, as a

conscientious citizen in a democracy, with this new knowledge, and (7) prepares a student for future self-directed learning and responsible action.

A SENCER instructor is someone who is committed to identifying his/her success as an instructor with the success of his/her students, who models a willingness to engage directly with unsettled and unsolved questions, and who helps students accomplish the goals previously identified by (1) using continuous assessment to promote success, (2) promoting oconnected, interdisciplinary learning, (3) providing students with ample opportunities to acquire and practice 21st C learning skills, and (4) sharing the products of his/her teaching and learning with a larger community of educators and the public.