

### 3.4 Building a Research-Supportive Curriculum

By building a research-supportive curriculum, our QEP addresses how faculty can bring the real world into the classroom. Faculty will be supported in their efforts to introduce students to the excitement of innovation and research as well as increase opportunities for them to participate in hands-on projects that require research-related skills.

The new *Research-Supportive Curriculum Development Program* will encourage faculty, departments, and colleges to enhance research-related skills training and to offer course-based research experiences to undergraduates. Since our students come to us with differing levels of interest in and aptitude for research, UH will develop a research-supportive curriculum at three levels: core, intermediate, and advanced. Co-curricular activities will be developed to complement these curricular opportunities through the coordination of the Office of Undergraduate Discovery Programs and Resource Collaborators (see Section 3.7).

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*In their own words...*

**“I commend the mission and goals of this program. As a recent committee member of PURS and SURF it has been very encouraging to mark the growth in undergraduate research as an essential element of our curriculum.”**

*Dr. Leonard Bachman, Faculty  
Gerald D. Hines College of Architecture  
QEP Online Feedback*

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#### 3.4.1 Research-Supportive Curriculum Development at the Core Level

Faculty, departments, and colleges may propose new introductory courses or enhancements to existing core courses that include research. These courses will provide students with a fundamental understanding of and appreciation for the research process as well as introduce them to research practices. Courses and curricular activities for faculty development and implementation at the freshman or sophomore level are summarized in Tables 7 and 8.



Table 7

### Research-Related Curricular Activities for Existing Core Courses

Category	Activity
Critical Thinking	Incorporating problem-based learning exercises for teams of students; requiring individual or team introductory research assignments, field-study assignments, or design projects that have research components
Information Literacy	Introducing the use of primary sources, secondary sources, and electronic resources; learning about discipline-specific information resources; reading and interpreting frequently cited scholarly research papers; assigning Internet-based research exercises that include evaluation of reliable sources; incorporating myth busters or fact-checking assignments based on TV shows, movies, or live performances
Research Ethics	Introducing responsible conduct of research principles; reviewing ethics case studies or engaging in ethics debates
Communication Skills	Requiring individual or team dissemination through written, oral, digital, or performance presentation; writing or presenting to different types of audiences
Research Awareness	Sharing faculty's own research in class or through lab tours when appropriate; inviting guest speakers into the classroom; incorporating a class field trip, off-campus tour, or virtual tour; using electronic "clickers" to teach and model survey research methods
Research in the Popular Press	Using features from television programs, news magazines, newspapers, or online news outlets as sources for cross-disciplinary research papers or in-class discussion
Invention and Discovery	Tracing the history of the discovery process for modern products; incorporating virtual dissection assignments to explain how common devices work; using UH professor John Lienhard's <i>Engines of Our Ingenuity</i> radio episodes as sources for research papers

Table 8

### Options for New Research-Related Introductory Courses

Course	Description
Introduction to Research Methods	Introduces research methods used in the sciences, business, social sciences, humanities, fine and performing arts, etc.
Discipline-Specific Research Methods	Introduces discipline-specific research methods to non-majors
Introduction to Applied Research at UH	Includes live talks and podcasts from UH faculty about their research and real-life application of their work
Introduction to Interdisciplinary Research at UH	Introduces the six UH research clusters and includes presentations from teams of faculty who collaborate within each cluster
Cutting-Edge Research	Highlights exciting state-of-the-art research in all disciplines including interdisciplinary research
Grand Challenges of the 21st Century	Reviews the grand challenges in various areas to be addressed by innovative interdisciplinary research (e.g., energy, health and medicine, information technology, environmental sciences, urbanization, etc.)

### 3.4.2 Research-Supportive Curriculum Development at the Intermediate Level

At the intermediate level, faculty may incorporate activities that reinforce research-related skills into courses in students' major fields of study. Examples include discipline-specific incorporation of problem-based or case-study assignments, enhancements in information literacy skills, and reinforcement of student mastery of various forms of communication, whether written, oral, visual, or digital.

Faculty will also be encouraged to propose additional innovative courses that make use of critical thinking skills and possibly span multiple disciplines. For example, *Historiography of Research* courses could be developed to engage students from various disciplines in reviewing and critiquing major research breakthroughs of the past century.

#### Writing in the Disciplines Courses

UH recently received approval from the Texas Higher Education Coordinating Board to institute a Core Curriculum change, designating Writing in the Disciplines (WID) as a requirement replacing the Social Sciences Writing Intensive option. This change in the Core Curriculum will provide faculty, departments, and colleges with an additional option for locating and enhancing the communication outcome for research as well as fulfilling discipline-specific degree requirements.

#### Research Assignments in Courses

Funding will be provided for initiatives to improve the quality of course-based research assignments or student work performed on such assignments. The majority of assignments supported in this category fall under the heading of information research.

Resources and support available to faculty and students during the development and teaching of courses includes reduced teaching assignments, summer support, student workshops, additional equipment, and targeted library acquisitions. The *Research-Supportive Curriculum Development Program* will also support teaching and research assistance (in the form of TAs, RAs, Writing Center consultants, or librarians), to expand the range of materials available to students for their research activities, or to improve the feedback given to students during their research and dissemination process. Some examples of these activities are:

- **Graduate Teaching Assistants** - Graduate TAs may be trained to provide important feedback and direction for students engaged in group or individual research projects, and to assist instructors in developing and grading writing assignments, literature reviews, and annotated bibliographies. These TAs could also assist in maintaining class or project blogs and websites.
- **Assignment Consultants** - Writing and Communication Skills Center staff or UH librarians may assist instructors by adapting pre-existing "modules" (on topics such as information literacy and research ethics), and by making themselves available for additional assistance to students. Writing Center staff can also provide faculty consultations on research assignment design and the development of grading rubrics.





- **Embedded Consultants** - Writing and Communication Skills Center staff or UH librarians could also engage in more extended, course-specific collaborations that would entail “embedding” librarians or Writing Center staff in courses. Librarians and Writing Center staff could assist faculty during the development phase and students (individually and in groups) during the teaching phase. Staff can also provide additional assistance with discipline- and course-specific information literacy training and feedback on students’ research and writing process.
- **Tools for Peer or Instructor Feedback** - Faculty may employ tools to enhance peer or instructor feedback, such as electronic portfolios, videotaped interviews, and breakout discussion groups.

### 3.4.3 Research-Supportive Curriculum Development at the Advanced Level

The research-intensive course designation will be used for advanced courses offering students the opportunity to engage in research projects that will improve their competencies in the six QEP student learning outcomes enumerated in Section 2.5. At the advanced level, the *Research-Supportive Curriculum Development Program* will accept faculty proposals to enhance existing courses or to develop new courses using one or more of the following research-based learning models:

- Research Methods
- Project-Based Laboratory
- Investigations in the Community
- Research Service Learning
- Capstone and Practicum Courses
- Collaborative Industry Projects
- Interdisciplinary Projects

These categories are not mutually exclusive and may be combined in the design of course enhancements or development of new courses. Students will be required to present their investigation results or recommendations in written, oral, digital, or performance presentation. Each of these research-based teaching models can also be adapted for team-oriented instruction. Faculty may draw upon existing partnerships or other sources of projects for their research-intensive courses. Faculty and student teams may also search the *Real-World Team Projects Database* for potential research-related projects. Interdisciplinary projects will be encouraged to give students a broader perspective reflective of the real world.

Research-intensive activities or courses to be supported by the *Research-Supportive Curriculum Development Program* are summarized in Table 9. Faculty will also be encouraged to propose their own innovative curricular approaches to integrating research. Grants for research-intensive courses will fund instructional support such as reduced teaching assignments, TA support, or partial summer support for faculty course development. The program will also underwrite faculty contracting with the Writing and Communication Skills Center, collaborating with the UH Libraries, or developing mentors from off campus to assist in the courses. Funds could be used for purchasing equipment for field measurements as well as project materials and supplies. Development of course-specific workshops or online resources will also be supported.

In addition to the research-intensive courses supported by this curriculum development grant program, departments will be encouraged to offer credit-bearing mentored research opportunities for students as elaborated in Section 3.6.1.

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*In their own words...*

“To mimic real-world industrial research projects, which typically involve engineers from multiple disciplines working over several years, a need exists for a subject-based, multi-year, multi-disciplinary engineering research program that can be used to attract talented engineering students for the research in selected subject area.”

*Dr. Thomas Chen, Faculty,  
Cullen College of Engineering  
“Call for Ideas” QEP Online Survey*

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Table 9

### Research-Intensive Activities or Courses

Activity or Course	Description
Research Methods	Provides opportunities for students to learn and practice research methods through data collection and analysis
Project-Based Laboratory	Engages students in the research process – reviewing the work of others, designing experiments, collecting data for analysis, and disseminating the results. Laboratory courses may also engage students in collecting and analyzing data for a real-world project or contribution to a large dataset
Investigations in the Community	Makes use of off-campus locations as laboratories for student research projects. Off-campus sites include Houston communities, businesses and industries, K-12 schools, and the Texas Medical Center
Research Service Learning	Engages students in collaborative projects that address a need or problem faced by a community client or partner (campus offices, small businesses, K-12 schools, government offices, non-profit organizations, etc.)
Capstone and Practicum Courses	Engages senior students in a culminating, synthesizing experience. Students will integrate their knowledge and skills learned in previous courses and apply them to a research problem, design problem, or creative activity. Multidisciplinary design courses that involve students from more than one major are encouraged as are multi-semester courses, allowing more time for teams to fully develop their projects
Collaborative Industry Projects	Engages teams of students in capstone research projects originating from industry partners. Projects can be carried out on campus or at the industrial partner's facility
Interdisciplinary Projects	Engages teams of students in interdisciplinary projects. Students must present to an audience of students and faculty from different academic majors – preferably from two or more departments. Teams of faculty may also collaborate on developing interdisciplinary projects linking several courses from different departments





### 3.4.4 Levels of Support for Research-Supportive Curriculum Development Program

As summarized below, three levels of funding will be provided by the *Research-Supportive Curriculum Development Program* to foster curricular innovation at all levels to maximize student benefit. This multi-level grant model has been used successfully in our existing Faculty Development Initiative Program (FDIP) described in Section 3.4.5.

**Individual Faculty** - Support for faculty to enhance existing courses or develop new courses at the core, intermediate or advanced research-intensive levels. Multi-semester courses are encouraged as they allow students to fully develop their projects.

**Faculty Team** - Support for teams of faculty who collaboratively develop a plan to adopt a research-based pedagogy in several or all sections of a particular course. Faculty may also propose development of student interdisciplinary projects which span several linked courses from different departments.

**Department or College** - Support for departmental or college initiatives that include research-based enhancements in multiple courses from freshman/sophomore through junior/senior levels. This vertical integration could involve introducing a training module or research-based learning model in several courses. College-wide curricular enhancements could also involve horizontal integration across the disciplines of training modules or research-based learning model (e.g., college-wide implementation of information literacy training or a capstone course in all majors).

### 3.4.5 Faculty Development Initiative Program

The *Faculty Development Initiative Program* (FDIP) is an existing program that offers faculty another opportunity to receive support for curricular innovations using technology. The FDIP has provided approximately \$350,000 to \$450,000 annually, as well as instructional assistance to faculty engaged in innovative teaching with technology. Administered by Educational Technology and University Outreach, FDIP awards faculty up to \$4,000 for FDIP A awards, and up to \$25,000 for FDIP B awards. The awards are based on proposals submitted by either an individual (FDIP A) or team of faculty (FDIP B), which are then reviewed and evaluated by a committee of peers. The funding can be used for course development, salaries for graduate assistants and support staff, instructional equipment, hardware and/or software, or to acquire other necessary academic technology materials. Instructional design and technical resources are also available for faculty as they develop and implement their projects.

Faculty may submit an FDIP proposal in addition to a QEP curriculum development proposal if course enhancements involve technology. Using both the FDIP and the QEP research curriculum development grant programs, faculty will be able to take full advantage of the power of combining research-based learning with instructional technology.