GLOBAL HEALTH TECHNOLOGIES

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Global Health Technologies
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Rice 360˚: Institute for Global Health collaborates with multiple departments to offer students a minor in Global Health Technologies (GLHT), a unique, multidisciplinary program to educate and train students to reach beyond traditional disciplinary and geographic boundaries to understand, address, and solve global health disparities. With complementary contributions from the humanities, social science, policy, bioscience, and engineering programs at Rice, the GLHT minor prepares students to integrate diverse perspectives as they develop solutions to the complex problems of global health, using the formal approach of the engineering design process.

The minor is open to Rice undergraduate students from all disciplines and requires completion of seven courses, including five core courses, and two electives. Students begin the minor by taking GLHT 201, which provides an overview of contemporary challenges and advances to improve human health. The course opens with an introduction to the epidemiology and physiology of the major human health problems throughout the world. With this introduction, we examine medical technologies to prevent infection, detect cancer and treat heart disease. The course is designed for non-engineering / non-science majors.

GLHT 201 - INTRODUCTION TO GLOBAL HEALTH
Short Title: INTRO TO GLOBAL HEALTH
Department: Global Health Technologies
Grade Mode: Standard Letter
Course Type: Lecture
Distribution Group: Distribution Group III
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Description: This course provides an overview of contemporary challenges and advances to improve human health. The course opens with an introduction to the epidemiology and physiology of the major human health problems throughout the world. With this introduction, we examine medical technologies to prevent infection, detect cancer and treat heart disease. The course is designed for non-engineering / non-science majors.

GLHT 451 and GLHT 452, which are taken in a two-semester sequence in which multidisciplinary teams of undergraduate students work together to design and implement solutions to existing global health challenges in the developing world. Elective courses include a range of subjects. Courses such as Immunology, Health Economics, Medical Chemistry, or Health Policy, provide students experience in engineering and social sciences as applied to international health challenges.

Throughout the program, GLHT students benefit from receiving guidance and mentorship from Rice faculty and graduate students as well as from the Texas Medical Center, partner organizations in developing countries, and clinicians to design low-cost, effective health technologies.

Minor

• Minor in Global Health Technologies (ga.rice.edu/programs-study/departments-programs/engineering/global-health-technologies/global-health-technologies-minor)

Global Health Technologies does not currently offer an academic program at the graduate level.

Director and Advisor
Rebecca Richards-Kortum

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Undergraduate Advisors
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For Rice University degree-granting programs:
To view the list of official course offerings, please see Rice’s Course Catalog (https://courses.rice.edu/admweb/ISWKSCAT.cat?p_action=cata)
To view the most recent semester’s course schedule, please see Rice’s Course Schedule (https://courses.rice.edu/admweb/ISWKSCAT.cat)

Global Health Technologies (GLHT)

GLHT 314 - SUSTAINABLE WATER PURIFICATION FOR THE DEVELOPING WORLD
Short Title: SUST WTR PURIF FOR DEV WORLD
Department: Global Health Technologies
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Description: This course provides an overview of sustainable strategies for safe water supply in off-the-grid, low-income regions. Topics covered include water quality and treatment, sustainability and WASH (water, sanitation and hygiene). A major element of the course is a project to solve a water-related issue in a real-world context. Cross-list: BIOE 365, CEVE 314. Repeatable for Credit.
GLHT 360 - APPROPRIATE DESIGN FOR GLOBAL HEALTH  
**Short Title:** APPR DESIGN FOR GLOBAL HEALTH  
**Department:** Global Health Technologies  
**Grade Mode:** Standard Letter  
**Course Type:** Seminar  
**Credit Hours:** 3  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** GLHT 201  
**Description:** Seminar-style introductory design course covering epidemiology, pathophysiology, health systems, health economics, medical ethics, humanitarian emergencies, scientific and engineering design methods, and appropriate health technology case studies. To register, you must be enrolled in the GLHT minor and submit a 250 statement to beyondtraditionalborders@rice.edu by Monday of preregistration. The minor and course prerequisite is waived for students majoring in Bioengineering. Instructor Permission Required. Cross-list: BIOE 360.

GLHT 361 - METABOLIC ENGINEERING FOR GLOBAL HEALTH ENVIRONMENTS  
**Short Title:** METAB ENG GLOBAL HEALTH ENVMT  
**Department:** Global Health Technologies  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):** (BIOE 362 or GLHT 362) and (PHYS 126 or PHYS 102 or PHYS 112 or PHYS 142) and MATH 102  
**Description:** Importance of nutritional and pharmaceutical compounds, impact of cost of compounds on global health; Overview of biochemical pathways; metabolite analysis; Genetic engineering and molecular biology tools for ME; Pharmaceuticals and drug discovery approaches (antibiotics, antivirals; anti-parasite compounds); anti-diarrhea treatments; vaccines. Cross-list: BIOC 361, BIOE 361.  
**Course URL:** www.btb.rice.edu

GLHT 392 - NEEDS FINDING AND DEVELOPMENT IN BIOENGINEERING  
**Short Title:** NEEDS FINDING & DEV IN BIOE  
**Department:** Global Health Technologies  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture/Laboratory  
**Credit Hours:** 3  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Prerequisite(s):**  
**Description:** Students in this course will learn and develop the engineering skill of needs finding in the field of bioengineering focused on designing for disabilities. Students will work in groups with patients with disabilities to identify daily needs and develop design criteria to meet those needs including preliminary prototype development. Instructor Permission Required. Cross-list: BIOE 392.

GLHT 400 - GLOBAL HEALTH TECHNOLOGIES INDEPENDENT RESEARCH PROJECTS  
**Short Title:** GLHT INDEPENDENT RESEARCH  
**Department:** Global Health Technologies  
**Grade Mode:** Standard Letter  
**Course Type:** Research  
**Credit Hours:** 1-3  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Description:** This course enables undergraduates pursuing the Global Health Technologies Minor to perform independent research on a specific design challenge in global health technology and innovation. Students are advised by the faculty and often mentored by a graduate student/post-doc. Instructor Permission Required. Repeatable for Credit.  
**Course URL:** www.btb.rice.edu

GLHT 401 - GLHT RESEARCH PAPER WRITING AND SUBMISSION  
**Short Title:** GLHT RESEARCH REPORTING  
**Department:** Global Health Technologies  
**Grade Mode:** Standard Letter  
**Course Type:** Research  
**Credit Hours:** 1  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Description:** Students in this course will work in the preparation of a paper reporting a previously completed design project. Instructor Permission Required. Repeatable for Credit.

GLHT 411 - INTERGRATED APPROACHES TO SUSTAINABLE DEVELOPMENT  
**Short Title:** SUSTAINABLE DEVELOPMENT  
**Department:** Global Health Technologies  
**Grade Mode:** Standard Letter  
**Course Type:** Lecture  
**Credit Hours:** 3  
**Restrictions:** Graduate level students may not enroll.  
**Course Level:** Undergraduate Upper-Level  
**Description:** This is a multidisciplinary course in which students explore the origins, connections and consequence of social and political tensions arising from the expansion of commercial energy resources in unique and rapidly changing Arctic and sub-Arctic environments. The challenge for the class will be to understand that in matters of sustainable development systemic complexities often give rise to a disconnect between analysis and decision-making. Topics will include the impacts of commercial energy development and drilling in rapidly changing Arctic environments, as well as strategies that can promote sustainable development and improved conditions for indigenous populations in the context of environmental challenges associated with the Arctic meltdown and drilling activities for oil and gas. Methodologies for structuring the analysis to be applied to enhance systemic resilience of the Alaska environment will be presented. Students will learn explore the barriers to sustainable development and discuss cost-effective, culturally appropriate solutions to energy related issues by integrating technical, organizational, and personal perspectives. Each class will have formal lecture(s) by Rice faculty or guest lecturer. Recommended Prerequisite(s): POST 401 Mutually Exclusive: Credit cannot be earned for GLHT 411 and POST 411. Repeatable for Credit.
GLHT 448 - TECHNOLOGY COMMERCIALIZATION IN DEVELOPING COUNTRIES FOR ENGINEERING
Short Title: TECH COMM IN DEV CTY FOR ENGS
Department: Global Health Technologies
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: This is a unique opportunity for engineering students to 1) collaborate with graduate business students to design and disseminate global health technologies; 2) learn about the sustainable distribution of health products in developing countries; 3) have a once-in-a-lifetime trip to Africa that tourism can never duplicate; and 4) help the poor. Working alongside advanced MBA students, engineering students will apply their skills to developing business plans for student-designed global health technologies that may influence dissemination and business plans. Interested students should email beyondtraditionalborders@rice.edu for an application. Instructor Permission Required.

GLHT 449 - TROUBLESHOOTING WORKSHOP FOR CLINICALLY-RELEVANT BIOMEDICAL EQUIPMENT
Short Title: MED BIOENGINEERING WORKSHOP
Department: Global Health Technologies
Grade Mode: Standard Letter
Course Type: Lecture/Laboratory
Credit Hour: 1
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): ELEC 243
Description: Bioengineering course in the troubleshooting, repair, and maintenance of standard biomedical equipment used in hospitals in the developed and developing worlds. Cross-list: BIOE 449. Repeatable for Credit.

GLHT 451 - GLOBAL HEALTH DESIGN CHALLENGES I
Short Title: GLOBAL HEALTH DESIGN I
Department: Global Health Technologies
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): GLHT 201 and (BIOE 360 or GLHT 360) and (GLHT 363 or BIOS 363 or PSYC 480 or SOCI 345)
Description: Students in this course will work on design projects to address global health disparities. Students will work in teams and partner with bioengineering students to develop solutions to particular problems in delivering healthcare in the developing world. Students must take GLHT 452 in the spring semester to complete their projects. Instructor Permission Required.
Course URL: www.btb.rice.edu

GLHT 452 - GLOBAL HEALTH DESIGN CHALLENGES II
Short Title: GLOBAL HEALTH DESIGN II
Department: Global Health Technologies
Grade Mode: Standard Letter
Course Type: Lecture
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Prerequisite(s): GLHT 451
Description: Students in this course will work on design projects to address global health disparities. Students will work in teams and partner with bioengineering students to develop solutions to particular problems in delivering healthcare in the developing world. Students must have taken GLHT 451 in the fall semester to initiate their projects.
Course URL: www.btb.rice.edu

GLHT 464 - SOCIAL ENTREPRENEURSHIP
Short Title: SOCIAL ENTREPRENEURSHIP
Department: Global Health Technologies
Grade Mode: Standard Letter
Course Type: Seminar
Distribution Group: Distribution Group II
Credit Hours: 3
Restrictions: Graduate level students may not enroll.
Course Level: Undergraduate Upper-Level
Description: This course introduces students to contemporary concepts, debates, and contexts necessary for analyzing and engaging in the sphere of social entrepreneurship. The course has five distinct parts: 1. social entrepreneurship overview; 2. social context and stakeholders; 3. private sector roles and motivations; 4. organizational forms and collaborations; and 5. measurement and impacts (private and public). Students will be exposed to various forms of social entrepreneurship, such as base of the pyramid/microenterprises, private-public partnerships, private-governmental partnerships, voluntary social codes, corporate social responsibility, and ethical consumerism. From this introductory foundation, students will undertake a social entrepreneurship project about a contemporary social problem in Houston: the urban food desert (https://apps.ams.usda.gov/fooddeserts/fooddeserts.aspx). Students will learn a range of research methods (e.g. quantitative data analysis, ethnography, focus groups). With these research tools and building from perspectives offered by earlier readings, guest speakers, and field visits, students will problematize, propose, develop, and present competing solutions to the social problem during the final course meetings. Cross-list: BUSI 464, SOSC 464.

GLHT 510 - SEMINAR IN TROPICAL MEDICINE
Short Title: SEMINAR IN TROPICAL MEDICINE
Department: Global Health Technologies
Grade Mode: Satisfactory/Unsatisfactory
Course Type: Seminar
Credit Hour: 1
Restrictions: Enrollment is limited to Graduate level students.
Course Level: Graduate
Description: 8 week lecture series on topics in global health. The theme for this offering is one health; integrating efforts to obtain optimal health for humans, animals, and the environment. Offered in conjunction with the new National School of Tropical Medicine, the course will feature lectures by various experts on the public health issues most pressing in poor populations in the world today. Course open to all undergraduates and graduate students. Cross-list: BIOE 510. Repeatable for Credit.
Description and Code Legend

Note: Internally, the university uses the following descriptions, codes, and abbreviations for this academic program. The following is a quick reference:

Course Catalog/Schedule
- Course offerings/subject code: GLHT

Program Description and Code
- Global Health Technologies: GLHT

Undergraduate Minor Description and Code
- Minor in Global Health Technologies: GLHT