

Faculty of Health Sciences and Semaan Faculty of Engineering and Architecture  
American University of Beirut

**PBHL 220 / PBHL 320CC / BMEN798- Special Topics :  
Design of Engineering Solutions for Health Challenges in Crises**

Winter Semester AY 2018 – 2019

Dates: January 2 – 18, 2019

Course Coordinators:

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Office hours: TBD

Class time and location:

This course falls under the category of Lecture + Lab. It is a mix of 40-45mn lectures, field work and lab time as per the detailed course schedule.

**Course description**

An interdisciplinary service learning design course focused on humanitarian engineering solutions for health challenges particularly in protracted crises. The course is targeted at undergraduate and graduate students from all discipline. Engineering and public health students are encouraged to register. Topics covered in the course include the context of displacement in the Arab region, health and health system challenges, design methodologies both in engineering and public health domains, relevant technologies and engineering tools. The course culminates in a major design experience carried out by a multidisciplinary group. This will include problem definition, stakeholders' involvement, ideation and design, prototyping and feasibility of deployment.

**Course learning outcomes**

By the end of the course, students will be able to:

1. Apply participatory needs assessment tools in humanitarian settings
2. Identify public health problems in humanitarian settings
3. Apply formal design processes from different disciplines for the design of relevant and feasible solutions and interventions given a set of constraints
4. Apply relevant appropriate technologies to prototype the designs
5. Use effective communication tools to promote the solution to a diverse audience
6. Work effectively in a team with diverse backgrounds and perspectives

### Required readings

Will be circulated throughout the course on Moodle.

### Course Structure

This course is designed and delivered in collaboration with the departments of Biomedical Engineering and International Health at Boston University. Students from this university will join the course on AUB campus.

The course will also be announced to public health practitioners working in refugee settings in Lebanon.

The course is delivered through interactive lectures and discussions. It includes a community-based learning component that will allow students to interact with refugees residing in camps to assess their public health needs and identify one priority issue to develop a solution for. Teams from different disciplines and from the 2 universities will be formed. Solutions will be ideated, designed and prototyped in a hackathon and the feasibility of the prototypes will be assessed with the community.

The course structure is as follows:

- 1- Interactive lectures and presentations, and development of research tools
- 2- Site visits to assess the needs and define the problem; hackathon to design and prototype
- 3- Prototype deployment assessment and presentation of design & prototype to a jury

### Course requirements and student evaluations

*Your performance in this course will be evaluated based on:*

	<b>Assessment</b>	<b>Percent</b>	<b>Linked to which learning outcome?</b>
A.	<b><i>Problem Definition:</i></b> Students will be divided into teams of 7-10. Students will develop a problem statement based on the assessment of needs conducted in the field	15%	1, 2
B.	<b><i>Design assignment:</i></b> Each team will design a solution to address the public health problem identified.	20%	3
C.	<b><i>Prototype:</i></b> Each team will develop a prototype of the proposed solution	30%	4
D.	<b><i>Teamwork:</i></b> Individual assessment through rubrics by peers and instructors	10%	6
E.	<b><i>Final Presentation:</i></b> Each team will present their solution and prototype to a jury	20%	5
F.	<b><i>Blog Post:</i></b> Each student will submit a short blog post describing their experience	5%	5

**Course ethics and AUB/FHS policies**

- The community-based learning component will require that you work off campus with partner institutions and in humanitarian settings; please maintain at all times a high degree of professionalism, confidentiality, respect for others and time, and a proper dress code.
  
- *Students with Disabilities:* AUB strives to make learning experiences accessible for all. If you anticipate or experience academic barriers due to a disability (such as ADHD, learning difficulties, mental health conditions, chronic or temporary medical conditions), please do not hesitate to inform the Accessible Education Office. In order to ensure that you receive the support you need and to facilitate a smooth accommodations process, you must register with the Accessible Education Office (AEO) as soon as possible: [accessibility@aub.edu.lb](mailto:accessibility@aub.edu.lb); [+961-1-350000](tel:+961-1-350000), x3246; West Hall, 314.
  
- *Non-Discrimination – Title IX – AUB:* AUB is committed to facilitating a campus free of all forms of discrimination including sex/gender-based harassment prohibited by Title IX. The University’s non-discrimination policy applies to, and protects, all students, faculty, and staff. If you think you have experienced discrimination or harassment, including sexual misconduct, we encourage you to tell someone promptly. If you speak to a faculty or staff member about an issue such as harassment, sexual violence, or discrimination, the information will be kept as private as possible, however, faculty and designated staff are required to bring it to the attention of the University’s Title IX Coordinator. Faculty can refer you to fully confidential resources, and you can find information and contacts at [www.aub.edu.lb/titleix](http://www.aub.edu.lb/titleix). To report an incident, contact the University’s Title IX Coordinator Trudi Hodges at 01-350000 ext. 2514, or [titleix@aub.edu.lb](mailto:titleix@aub.edu.lb). An anonymous report may be submitted online via EthicsPoint at [www.aub.ethicspoint.com](http://www.aub.ethicspoint.com).

**Detailed course schedule and lessons plan**

Main lecturers will be Hala Ghattas & Aline Germani (FHS), Imad Elhajj and Zaher Dawy (MSFEA), Muhammad Zaman from Boston University. Other guest lecturers from the 2 universities will be identified to cover few sessions and mentor teams during the hackathon.

<b>Date</b>	<b>Subject</b>
<b>Jan 2</b>  LO 1	<u>Context of refugees and public health challenges in humanitarian settings</u>  <b>Session 1:</b> The modern state, national identity and statelessness <b>Session 2:</b> Demographics, region, and history of the refugee population and socio-economic challenges faced by various waves of refugees in Lebanon <b>Session 3:</b> Contextual understanding of the origins of Syrian refugees <b>Session 4 :</b> The current challenges in health in humanitarian context <b>Session 5:</b> The ethical terrain of our work
<b>Jan 3</b> LO 2	<u>Introduction to refugee settlements</u> <b>Hackathon:</b> Field visit for all teams
<b>Jan 4</b>  LO 1, 2	<u>Needs assessment and problem statement: Concepts &amp; methodologies</u> <b>Session 6:</b> Introduction to SPHERE and context assessment tools: infrastructure, social, geographic, environmental, shelter <b>Session 7:</b> Needs assessment: Hands-on activities on some tools used in humanitarian settings <b>Session 8:</b> How to formulate a problem statement
<b>Jan 7</b> LO 1, 6	<b>Hackathon:</b> Teams refine research tools
<b>Jan 8</b> LO 1, 2	<u>Conduct needs assessment and identify potential constraints to design</u> <b>Hackathon:</b> Field visits for all teams
<b>Jan 9</b>  LO 3, 4	<u>Introduction to design</u> <b>Session 9:</b> Participatory design methods <b>Session 10:</b> Critique of humanitarian engineering interventions
<b>Jan 10</b> LO 2, 3	<u>Conduct needs assessment and identify potential constraints to design</u> <b>Hackathon:</b> Field visits for all teams
<b>Jan 11</b>  LO 1, 2,3, 4	<b>Session 11:</b> Feedback on problem statement and refinement <u>From design and tools to effective and sustainable solutions</u> <b>Session 12:</b> Technologies for developing humanitarian health solutions with case studies. <b>Session 13:</b> Applied lab session <b>Session 14:</b> Creating scale and sustainability of solutions, both in impact and in finances

<b>Jan 14</b> <i>LO 3, 4, 6</i>	<u><i>Ideation and design</i></u> <b>Hackathon:</b> Teams will work on their designs
<b>Jan 15</b> <i>LO 2, 6</i>	<u><i>Prototyping</i></u> <b>Hackathon:</b> Teams will work on their prototypes
<b>Jan 16</b> <i>LO 3, 4, 6</i>	<u><i>Assess feasibility of prototype</i></u> <b>Hackathon:</b> Teams will refine their prototypes
<b>Jan 17</b> <i>LO 3, 5, 6</i>	<b>Session 15:</b> How to Pitch? <b>Session 16:</b> Innovation & entrepreneurship
<b>Jan 18</b> <i>LO 5</i>	<b>Session 17:</b> Next steps: Potential for moving forward with groups' projects <b>Hackathon:</b> Final presentation and competition